EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

Table of contents

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

A1: Content

Proposal Number	607085	Proposal Acronym	EUCLEIA
Project Type	CP-FP		

General Information

Proposal Title	EUropean CLimate and weather Events: Interpretation and Attribution
Duration in months	36
Call (part) Identifier	FP7-SPACE-2013-1

Activity code(s) most relevant to your topic	SPA.2013.1.1-05	SPA.2013.1.1-05	

Abstract (max. 2000 chars)

Climate change is expected to impact extreme weather in Europe. There is therefore a clear need to adapt effectively to climate change, particularly in Europe, where recent heatwaves, floods and droughts have demonstrated the vulnerability of European citizens to extreme weather. However, scientifically robust information about the extent to which recent extreme weather can be linked to climate variability and change is often lacking. There is therefore a clear need to develop better information on weather and climate risks as part of the operational capacities in the climate change context of GMES.

EUCLEIA will develop the means to provide reliable information about weather and climate risks by developing a quasi-operational event attribution system for Europe. This system will be used to investigate heat waves, cold spells, floods, droughts and storm surges by means of developing a comprehensive set of diagnostics of the processes under study. It will provide well verified assessments of the extent to which such weather-related risks have changed due to human influences on climate. It will also identify those types of weather events where the science is still too uncertain to make a robust assessment of attributable risk.

EUCLEIA will work closely with targeted stakeholder groups, including the insurance industry, regional managers and policy makers, general public and the legal field, to establish user requirements for event attribution products and to facilitate the development of climate attribution strategies. The attribution system developed by EUCLEIA will deliver reliable and user-relevant attribution assessments on a range of timescales; on a fast track basis in the immediate aftermath of extreme events, on a seasonal basis to stakeholder groups and annually to the scientifically prestigious annual attribution supplement of the Bulletin of the American Meteorological Society.

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

Free keywords

Climate change attribution.
Extreme weather events.
Climate monitoring.
Climate services.
Weather-related risks.
Climate change adaptation.
Heatwaves. Floods. Droughts. Cold spells. Storm surges.

a) Has this proposal (or a very similar one) been previously submitted to a call for proposals of the 7th EU RTD Framework Programme ? ○ Yes ◉ No

b) Is this proposal (or a similar one) currently being submitted to another call under FP7 ? ○ Yes ◉ No

EUROPEAN COMMISSION

7th Framework Programme for Research, technological Development and Demonstration

A2.1 Participant #1

UKMO

If your organisation has already registered for FP7, enter your Participant Identity Code ***999892685***

Legal Name ***MET OFFICE***

Organisation short name ***UKMO***

Administrative data (legal address)

Street name ***FitzRoy Road*** Number

Town ***EXETER***

Postal Code / Cedex ***EX1 3PB***

Country ***UK***

Internet homepage ***www.metoffice.gov.uk***

Status of your organisation

Certain types of organisations benefit from special conditions under the FP7 participant rules. The Commission also collects data for statistical purposes.

The guidance notes will help you complete this section.

Please 'tick' the relevant box(es) if your organisation falls into one ore more of the following categories.

Non-profit organisation	○ Yes	◉ No
Public body	◉ Yes	○ No
Research organisation	○ Yes	◉ No
Higher or secondary education establishment	○ Yes	◉ No

Main area of activity (NACE code) -

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

1. Is your number of employees smaller than 250? (full time equivalent)	○ Yes	◉ No
2. Is your annual turnover smaller than € 50 million?	○ Yes	◉ No
3. Is your annual balance sheet total smaller than € 43 million?	○ Yes	◉ No
4. Are you an autonomous legal entity?	○ Yes	◉ No

You are NOT an SME if your answer to question 1 is "NO" and/or your answer to both questions 2 and 3 is "NO".

In all other cases, you might conform to the Commission's definition of an SME.

Please check the additional conditions given in the guidance notes to the forms.

Following this check, do you conform to the Commission's definition of an SME? ○ Yes ◉ No

Dependencies with (an)other participant(s)

Are there dependencies between your organisation and (an)other participant(s) in this proposal? ○ Yes ◉ No

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

Contact point - Person in charge for participant #1

For the co-ordinator (Participant #1) this person is the one who the Commission will contact in the first instance.

Family name* ***Helmore*** First name(s)* ***Phil***

Title Mr.

(•) Male ( ) Female

Position in the organisation Bids Manager

Department/Faculty/Institute/Laboratory name/... Met Office

Address ☒ Same as legal address

Street name FitzRoy Road Number

Town EXETER Postal Code/Cedex EX1 3PB

Country UK

Phone1* + Phone2 + 1392 885004

Fax + 1392 885681 E-mail* ***phil.helmore@metoffice.gov.uk***

** Contact details can only be changed by the Proposal Coordinator via the "Step 4 – Manage Your Related Parties" screen.*

EUROPEAN COMMISSION

7th Framework Programme for Research, technological Development and Demonstration

A2.2 Participant #2

ETH Zurich

If your organisation has already registered for FP7, enter your Participant Identity Code	***999979015***
Legal Name	***EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZURICH***
Organisation short name	***ETH Zurich***

Administrative data (legal address)

Street name	***Raemistrasse***	Number	***101***
Town	***ZUERICH***		
Postal Code / Cedex	***8092***		
Country	***CH***		
Internet homepage	***www.ethz.ch***		

Status of your organisation

Certain types of organisations benefit from special conditions under the FP7 participant rules. The Commission also collects data for statistical purposes.

The guidance notes will help you complete this section.

Please 'tick' the relevant box(es) if your organisation falls into one ore more of the following categories.

Non-profit organisation	(•) Yes	( ) No
Public body	(•) Yes	( ) No
Research organisation	(•) Yes	( ) No
Higher or secondary education establishment	(•) Yes	( ) No

Main area of activity (NACE code): 80.3

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

1. Is your number of employees smaller than 250? (full time equivalent)	○ Yes	◉ No
2. Is your annual turnover smaller than € 50 million?	○ Yes	◉ No
3. Is your annual balance sheet total smaller than € 43 million?	○ Yes	◉ No
4. Are you an autonomous legal entity?	◉ Yes	○ No

You are NOT an SME if your answer to question 1 is "NO" and/or your answer to both questions 2 and 3 is "NO".

In all other cases, you might conform to the Commission's definition of an SME.

Please check the additional conditions given in the guidance notes to the forms.

Following this check, do you conform to the Commission's definition of an SME?	○ Yes	◉ No

Dependencies with (an)other participant(s)

Are there dependencies between your organisation and (an)other participant(s) in this proposal?	○ Yes	◉ No

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

Contact point - Person in charge for participant #2

For the co-ordinator (Participant #1) this person is the one who the Commission will contact in the first instance.

Family name* ***Seneviratne*** First name(s)* ***Sonia***

Title Prof.

○ Male ◉ Female

Position in the organisation Professor

Department/Faculty/Institute/Laboratory name/... Institute for Atmospheric and Climate Science

Address ☐ Same as legal address

Street name Universitätstrasse Number 16

Town Zurich Postal Code/Cedex 8092

Country CH

Phone1* + ***41*** ***446328076*** Phone2 +

Fax + E-mail* ***sonia.seneviratne@env.ethz.ch***

** Contact details can only be changed by the Proposal Coordinator via the "Step 4 – Manage Your Related Parties" screen.*

EUROPEAN COMMISSION

7th Framework Programme for Research, technological Development and Demonstration

A2.3 Participant #3

CNRS

If your organisation has already registered for FP7, enter your Participant Identity Code ***999997930***

Legal Name ***CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE***

Organisation short name ***CNRS***

Administrative data (legal address)

Street name ***Rue Michel -Ange*** Number ***3***

Town ***PARIS***

Postal Code / Cedex ***75794***

Country ***FR***

Internet homepage ***www.cnrs.fr***

Status of your organisation

Certain types of organisations benefit from special conditions under the FP7 participant rules. The Commission also collects data for statistical purposes.

The guidance notes will help you complete this section.

Please 'tick' the relevant box(es) if your organisation falls into one ore more of the following categories.

Non-profit organisation	(•) Yes	( ) No
Public body	(•) Yes	( ) No
Research organisation	(•) Yes	( ) No
Higher or secondary education establishment	( ) Yes	(•) No

Main area of activity (NACE code) 73.1

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

1. Is your number of employees smaller than 250? (full time equivalent) ○ Yes ○ No

2. Is your annual turnover smaller than € 50 million? ○ Yes ○ No

3. Is your annual balance sheet total smaller than € 43 million? ○ Yes ○ No

4. Are you an autonomous legal entity? ○ Yes ○ No

You are NOT an SME if your answer to question 1 is "NO" and/or your answer to both questions 2 and 3 is "NO".

In all other cases, you might conform to the Commission's definition of an SME.

Please check the additional conditions given in the guidance notes to the forms.

Following this check, do you conform to the Commission's definition of an SME? ○ Yes ◉ No

Dependencies with (an)other participant(s)

Are there dependencies between your organisation and (an)other participant(s) in this proposal? ○ Yes ◉ No

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

Contact point - Person in charge for participant #3

For the co-ordinator (Participant #1) this person is the one who the Commission will contact in the first instance.

Family name* ***Vautard*** First name(s)* ***Robert***

Title Dr.

(•) Male ( ) Female

Position in the organisation Senior Researcher

Department/Faculty/Institute/Laboratory name/... DSM/LSCE

Address ☐ Same as legal address

Street name LSCE UMR CEA/CNRS/UVSQ, Orme des Merisiers, Bât 712 Number

Town Gif-sur-Yvette Postal Code/Cedex 91190

Country FR

Phone1* + Phone2 + 33 1 0 69 08 26 40

Fax + 33 1 06 08 77 16 E-mail* ***robert.vautard@lsce.ipsl.fr***

** Contact details can only be changed by the Proposal Coordinator via the "Step 4 – Manage Your Related Parties" screen.*

EUROPEAN COMMISSION

7th Framework Programme for Research, technological Development and Demonstration

A2.4 Participant #4

UEDIN

If your organisation has already registered for FP7, enter your Participant Identity Code	***999974941***
Legal Name	***THE UNIVERSITY OF EDINBURGH***
Organisation short name	***UEDIN***

Administrative data (legal address)

Street name	***OLD COLLEGE, SOUTH BRIDGE***	Number	
Town	***EDINBURGH***		
Postal Code / Cedex	***EH8 9YL***		
Country	***UK***		
Internet homepage	***www.ed.ac.uk***		

Status of your organisation

Certain types of organisations benefit from special conditions under the FP7 participant rules. The Commission also collects data for statistical purposes.

The guidance notes will help you complete this section.

Please 'tick' the relevant box(es) if your organisation falls into one ore more of the following categories.

Non-profit organisation	(•) Yes	( ) No
Public body	(•) Yes	( ) No
Research organisation	(•) Yes	( ) No
Higher or secondary education establishment	(•) Yes	( ) No

Main area of activity (NACE code)	80.3

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

1. Is your number of employees smaller than 250? (full time equivalent)	○ Yes	◉ No
2. Is your annual turnover smaller than € 50 million?	○ Yes	◉ No
3. Is your annual balance sheet total smaller than € 43 million?	○ Yes	◉ No
4. Are you an autonomous legal entity?	○ Yes	◉ No

You are NOT an SME if your answer to question 1 is "NO" and/or your answer to both questions 2 and 3 is "NO".

In all other cases, you might conform to the Commission's definition of an SME.

Please check the additional conditions given in the guidance notes to the forms.

Following this check, do you conform to the Commission's definition of an SME? ○ Yes ◉ No

Dependencies with (an)other participant(s)

Are there dependencies between your organisation and (an)other participant(s) in this proposal? ○ Yes ◉ No

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

Contact point - Person in charge for participant #4

For the co-ordinator (Participant #1) this person is the one who the Commission will contact in the first instance.

Family name* ***Tett*** First name(s)* ***Simon***

Title Prof.

(•) Male ( ) Female

Position in the organisation Professor of Earth System Dynamics

Department/Faculty/Institute/Laboratory name/... School of Geosciences

Address ☐ Same as legal address

Street name Grant Institute of Earth Science, West Mains Road Number

Town Edinburgh Postal Code/Cedex EH9 3JW

Country UK

Phone1* + Phone2 + 44 0131 650 5341

Fax + E-mail* ***simon.tett@ed.ac.uk***

** Contact details can only be changed by the Proposal Coordinator via the "Step 4 – Manage Your Related Parties" screen.*

EUROPEAN COMMISSION

7th Framework Programme for Research, technological Development and Demonstration

A2.5 Participant #5

IC3

If your organisation has already registered for FP7, enter your Participant Identity Code ***994170073***

Legal Name ***FUNDACIO INSTITUT CATALA DE CIENCIES DEL CLIMA***

Organisation short name ***IC3***

Administrative data (legal address)

Street name ***CALLE BALDIRI REIXAC*** Number ***2***

Town ***Barcelona***

Postal Code / Cedex ***08028***

Country ***ES***

Internet homepage ***www.ic3.cat***

Status of your organisation

Certain types of organisations benefit from special conditions under the FP7 participant rules. The Commission also collects data for statistical purposes.

The guidance notes will help you complete this section.

Please 'tick' the relevant box(es) if your organisation falls into one ore more of the following categories.

Non-profit organisation	(•) Yes	( ) No
Public body	( ) Yes	(•) No
Research organisation	(•) Yes	( ) No
Higher or secondary education establishment	( ) Yes	(•) No

Main area of activity (NACE code) 73.1

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

1. Is your number of employees smaller than 250? (full time equivalent)	◉ Yes	○ No
2. Is your annual turnover smaller than € 50 million?	○ Yes	◉ No
3. Is your annual balance sheet total smaller than € 43 million?	○ Yes	◉ No
4. Are you an autonomous legal entity?	○ Yes	◉ No

You are NOT an SME if your answer to question 1 is "NO" and/or your answer to both questions 2 and 3 is "NO".

In all other cases, you might conform to the Commission's definition of an SME.

Please check the additional conditions given in the guidance notes to the forms.

Following this check, do you conform to the Commission's definition of an SME? ○ Yes ◉ No

Dependencies with (an)other participant(s)

Are there dependencies between your organisation and (an)other participant(s) in this proposal? ○ Yes ◉ No

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

Contact point - Person in charge for participant #5

For the co-ordinator (Participant #1) this person is the one who the Commission will contact in the first instance.

Family name* ***Doblas-Reyes*** First name(s)* ***Francisco***

Title Prof. (Male) (Female)

Position in the organisation Head of Unit

Department/Faculty/Institute/Laboratory name/... Climate Forecasting Unit

Address ☐ Same as legal address

Street name Doctor Trueta Number 203

Town Barcelona Postal Code/Cedex 08005

Country ES

Phone1* + Phone2 + 34 935679977

Fax + E-mail* ***f.doblas-reyes@ic3.cat***

** Contact details can only be changed by the Proposal Coordinator via the "Step 4 – Manage Your Related Parties" screen.*

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

A2.6 Participant #6

DMI

If your organisation has already registered for FP7, enter your Participant Identity Code ***999509438***

Legal Name ***DANMARKS METEOROLOGISKE INSTITUT***

Organisation short name ***DMI***

Administrative data (legal address)

Street name ***Lyngbyvej 100*** Number

Town ***KOBENHAVN***

Postal Code / Cedex ***2100***

Country ***DK***

Internet homepage ***www.dmi.dk***

Status of your organisation

Certain types of organisations benefit from special conditions under the FP7 participant rules. The Commission also collects data for statistical purposes.

The guidance notes will help you complete this section.

Please 'tick' the relevant box(es) if your organisation falls into one ore more of the following categories.

Non-profit organisation	(•) Yes	( ) No
Public body	(•) Yes	( ) No
Research organisation	(•) Yes	( ) No
Higher or secondary education establishment	( ) Yes	(•) No

Main area of activity (NACE code) R&D on natural sciences and engineering

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

1. Is your number of employees smaller than 250? (full time equivalent)	○ Yes	◉ No
2. Is your annual turnover smaller than € 50 million?	◉ Yes	○ No
3. Is your annual balance sheet total smaller than € 43 million?	◉ Yes	○ No
4. Are you an autonomous legal entity?	◉ Yes	○ No

You are NOT an SME if your answer to question 1 is "NO" and/or your answer to both questions 2 and 3 is "NO".

In all other cases, you might conform to the Commission's definition of an SME.

Please check the additional conditions given in the guidance notes to the forms.

Following this check, do you conform to the Commission's definition of an SME? ○ Yes ◉ No

Dependencies with (an)other participant(s)

Are there dependencies between your organisation and (an)other participant(s) in this proposal? ○ Yes ◉ No

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

Contact point - Person in charge for participant #6

For the co-ordinator (Participant #1) this person is the one who the Commission will contact in the first instance.

Family name* ***Christiansen*** First name(s)* ***Bo***

Title Dr.

(•) Male ( ) Female

Position in the organisation Senior Scientist

Department/Faculty/Institute/Laboratory name/... Danish Climate Centre

Address ☒ Same as legal address

Street name Lyngbyvej 100 Number

Town KOBENHAVN Postal Code/Cedex 2100

Country DK

Phone1* + Phone2 + 45 39157429

Fax + 45 39157460 E-mail* ***boc@dmi.dk***

** Contact details can only be changed by the Proposal Coordinator via the "Step 4 – Manage Your Related Parties" screen.*

EUROPEAN COMMISSION

7th Framework Programme for Research, technological Development and Demonstration

A2.7 Participant #7

KNMI

If your organisation has already registered for FP7, enter your Participant Identity Code ***999518944***

Legal Name ***KONINKLIJK NEDERLANDS METEOROLOGISCH INSTITUUT-KNMI***

Organisation short name ***KNMI***

Administrative data (legal address)

Street name ***Wilhelminalaan*** Number ***10***

Town ***DE BILT***

Postal Code / Cedex ***3732 GK***

Country ***NL***

Internet homepage ***www.knmi.nl***

Status of your organisation

Certain types of organisations benefit from special conditions under the FP7 participant rules. The Commission also collects data for statistical purposes.

The guidance notes will help you complete this section.

Please 'tick' the relevant box(es) if your organisation falls into one ore more of the following categories.

Non-profit organisation	(•) Yes	( ) No
Public body	(•) Yes	( ) No
Research organisation	(•) Yes	( ) No
Higher or secondary education establishment	( ) Yes	(•) No

Main area of activity (NACE code) L

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

1. Is your number of employees smaller than 250? (full time equivalent)	○ Yes	◉ No
2. Is your annual turnover smaller than € 50 million?	○ Yes	◉ No
3. Is your annual balance sheet total smaller than € 43 million?	○ Yes	◉ No
4. Are you an autonomous legal entity?	○ Yes	◉ No

You are NOT an SME if your answer to question 1 is "NO" and/or your answer to both questions 2 and 3 is "NO".

In all other cases, you might conform to the Commission's definition of an SME.

Please check the additional conditions given in the guidance notes to the forms.

Following this check, do you conform to the Commission's definition of an SME? ○ Yes ◉ No

Dependencies with (an)other participant(s)

Are there dependencies between your organisation and (an)other participant(s) in this proposal? ○ Yes ◉ No

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

Contact point - Person in charge for participant #7

For the co-ordinator (Participant #1) this person is the one who the Commission will contact in the first instance.

Family name* ***van Oldenborgh*** First name(s)* ***Geert Jan***

Title: Dr.

(•) Male ( ) Female

Position in the organisation: senior researcher

Department/Faculty/Institute/Laboratory name/...: KS/MK

Address ☒ Same as legal address

Street name: Wilhelminalaan Number: 10

Town: DE BILT Postal Code/Cedex: 3732 GK

Country: NL

Phone1* + Phone2 + 31 302206711

Fax + 31 302202570 E-mail* ***oldenborgh@knmi.nl***

** Contact details can only be changed by the Proposal Coordinator via the "Step 4 – Manage Your Related Parties" screen.*

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

A2.8 Participant #8

UNI READING

If your organisation has already registered for FP7, enter your Participant Identity Code ***999984156***

Legal Name ***THE UNIVERSITY OF READING***

Organisation short name ***UNI READING***

Administrative data (legal address)

Street name ***Whiteknights House, Whiteknights*** Number

Town ***READING***

Postal Code / Cedex ***RG6 6AH***

Country ***UK***

Internet homepage ***http://www.rdg.ac.uk***

Status of your organisation

Certain types of organisations benefit from special conditions under the FP7 participant rules. The Commission also collects data for statistical purposes.

The guidance notes will help you complete this section.

Please 'tick' the relevant box(es) if your organisation falls into one ore more of the following categories.

Non-profit organisation	(•) Yes	( ) No
Public body	(•) Yes	( ) No
Research organisation	(•) Yes	( ) No
Higher or secondary education establishment	(•) Yes	( ) No

Main area of activity (NACE code) Higher education

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

1. Is your number of employees smaller than 250? (full time equivalent)	○ Yes	◉ No
2. Is your annual turnover smaller than € 50 million?	○ Yes	◉ No
3. Is your annual balance sheet total smaller than € 43 million?	○ Yes	◉ No
4. Are you an autonomous legal entity?	◉ Yes	○ No

You are NOT an SME if your answer to question 1 is "NO" and/or your answer to both questions 2 and 3 is "NO".

In all other cases, you might conform to the Commission's definition of an SME.

Please check the additional conditions given in the guidance notes to the forms.

Following this check, do you conform to the Commission's definition of an SME?	○ Yes	◉ No

Dependencies with (an)other participant(s)

Are there dependencies between your organisation and (an)other participant(s) in this proposal?	○ Yes	◉ No

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

Contact point - Person in charge for participant #8

For the co-ordinator (Participant #1) this person is the one who the Commission will contact in the first instance.

Family name* ***Reynolds*** First name(s)* ***Tom***

Title Prof.

(•) Male ( ) Female

Position in the organisation Director of Climate Research NCAS

Department/Faculty/Institute/Laboratory name/... Department of Meteorology

Address ☐ Same as legal address

Street name Whiteknights Campus, Earley Gate Number

Town Reading Postal Code/Cedex RG6 6BB

Country UK

Phone1* + ***44*** ***1183786060*** Phone2 + 44 118 378 8337

Fax + 44 118 378 8316 E-mail* ***t.reynolds@reading.ac.uk***

** Contact details can only be changed by the Proposal Coordinator via the "Step 4 – Manage Your Related Parties" screen.*

EUROPEAN COMMISSION

7th Framework Programme for Research, technological Development and Demonstration

A2.9 Participant #9

UOXF

If your organisation has already registered for FP7, enter your Participant Identity Code ***999984350***

Legal Name ***THE CHANCELLOR, MASTERS AND SCHOLARS OF THE UNIVERSITY OF OXFORD***

Organisation short name ***UOXF***

Administrative data (legal address)

Street name ***University Offices, Wellington Square*** Number

Town ***OXFORD***

Postal Code / Cedex ***OX1 2JD***

Country ***UK***

Internet homepage ***www.ox.ac.uk***

Status of your organisation

Certain types of organisations benefit from special conditions under the FP7 participant rules. The Commission also collects data for statistical purposes.

The guidance notes will help you complete this section.

Please 'tick' the relevant box(es) if your organisation falls into one ore more of the following categories.

Non-profit organisation	(•) Yes	( ) No
Public body	(•) Yes	( ) No
Research organisation	(•) Yes	( ) No
Higher or secondary education establishment	(•) Yes	( ) No

Main area of activity (NACE code) 80.3

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

1. Is your number of employees smaller than 250? (full time equivalent)	○ Yes	◉ No
2. Is your annual turnover smaller than € 50 million?	○ Yes	◉ No
3. Is your annual balance sheet total smaller than € 43 million?	○ Yes	◉ No
4. Are you an autonomous legal entity?	○ Yes	◉ No

You are NOT an SME if your answer to question 1 is "NO" and/or your answer to both questions 2 and 3 is "NO".

In all other cases, you might conform to the Commission's definition of an SME.

Please check the additional conditions given in the guidance notes to the forms.

Following this check, do you conform to the Commission's definition of an SME? ○ Yes ◉ No

Dependencies with (an)other participant(s)

Are there dependencies between your organisation and (an)other participant(s) in this proposal? ○ Yes ◉ No

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

Contact point - Person in charge for participant #9

For the co-ordinator (Participant #1) this person is the one who the Commission will contact in the first instance.

Family name* ***Pialek*** First name(s)* ***Linda***

Title Ms ○ Male ◉ Female

Position in the organisation Head of European Team

Department/Faculty/Institute/Laboratory name/... Research Services

Address ☒ Same as legal address

Street name University Offices, Wellington Square Number

Town OXFORD Postal Code/Cedex OX1 2JD

Country UK

Phone1* + ***44*** ***1865289800*** Phone2 + 4418 289800

Fax + 44 1865 289801 E-mail* ***ecresearch@admin.ox.ac.uk***

** Contact details can only be changed by the Proposal Coordinator via the "Step 4 – Manage Your Related Parties" screen.*

EUROPEAN COMMISSION

7th Framework Programme for Research, technological Development and Demonstration

A2.10 Participant #10

HZG

If your organisation has already registered for FP7, enter your Participant Identity Code ***999507401***

Legal Name ***HELMHOLTZ-ZENTRUM GEESTHACHT ZENTRUM FUR MATERIAL- UND KUSTENFOR***

Organisation short name ***HZG***

Administrative data (legal address)

Street name ***Max-Planck-Strasse*** Number ***1***

Town ***GEESTHACHT***

Postal Code / Cedex ***21502***

Country ***DE***

Internet homepage ***www.hzg.de***

Status of your organisation

Certain types of organisations benefit from special conditions under the FP7 participant rules. The Commission also collects data for statistical purposes.

The guidance notes will help you complete this section.

Please 'tick' the relevant box(es) if your organisation falls into one ore more of the following categories.

Non-profit organisation	(•) Yes	( ) No
Public body	( ) Yes	(•) No
Research organisation	(•) Yes	( ) No
Higher or secondary education establishment	( ) Yes	(•) No

Main area of activity (NACE code) 73.1

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

1. Is your number of employees smaller than 250? (full time equivalent)	○ Yes	◉ No
2. Is your annual turnover smaller than € 50 million?	○ Yes	◉ No
3. Is your annual balance sheet total smaller than € 43 million?	○ Yes	◉ No
4. Are you an autonomous legal entity?	◉ Yes	○ No

You are NOT an SME if your answer to question 1 is "NO" and/or your answer to both questions 2 and 3 is "NO".

In all other cases, you might conform to the Commission's definition of an SME.

Please check the additional conditions given in the guidance notes to the forms.

Following this check, do you conform to the Commission's definition of an SME?	○ Yes	◉ No

Dependencies with (an)other participant(s)

Are there dependencies between your organisation and (an)other participant(s) in this proposal?	○ Yes	◉ No

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

Contact point - Person in charge for participant #10

For the co-ordinator (Participant #1) this person is the one who the Commission will contact in the first instance.

Family name* ***von Storch*** First name(s)* ***Hans***

Title Prof.

(•) Male ( ) Female

Position in the organisation Institute director

Department/Faculty/Institute/Laboratory name/... Institute of Coastal Research

Address ☒ Same as legal address

Street name Max-Planck-Strasse Number 1

Town GEESTHACHT Postal Code/Cedex 21502

Country DE

Phone1* + Phone2 +

Fax + 49 4152 87 41831 E-mail* ***hvonstorch@web.de***

** Contact details can only be changed by the Proposal Coordinator via the "Step 4 – Manage Your Related Parties" screen.*

EUROPEAN COMMISSION

7th Framework Programme for Research, technological Development and Demonstration

A2.11 Participant #11

UVSQ

If your organisation has already registered for FP7, enter your Participant Identity Code ***999837104***

Legal Name ***UNIVERSITE DE VERSAILLES SAINT-QUENTIN-EN-YVELINES.***

Organisation short name ***UVSQ***

Administrative data (legal address)

Street name ***Avenue de Paris*** Number ***55***

Town ***VERSAILLES***

Postal Code / Cedex ***78035***

Country ***FR***

Internet homepage ***www.uvsq.fr***

Status of your organisation

Certain types of organisations benefit from special conditions under the FP7 participant rules. The Commission also collects data for statistical purposes.

The guidance notes will help you complete this section.

Please 'tick' the relevant box(es) if your organisation falls into one ore more of the following categories.

Non-profit organisation	(•) Yes	( ) No
Public body	(•) Yes	( ) No
Research organisation	(•) Yes	( ) No
Higher or secondary education establishment	(•) Yes	( ) No

Main area of activity (NACE code) 80.3

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

1. Is your number of employees smaller than 250? (full time equivalent)	○ Yes	◉ No
2. Is your annual turnover smaller than € 50 million?	○ Yes	◉ No
3. Is your annual balance sheet total smaller than € 43 million?	○ Yes	◉ No
4. Are you an autonomous legal entity?	◉ Yes	○ No

You are NOT an SME if your answer to question 1 is "NO" and/or your answer to both questions 2 and 3 is "NO".

In all other cases, you might conform to the Commission's definition of an SME.

Please check the additional conditions given in the guidance notes to the forms.

Following this check, do you conform to the Commission's definition of an SME?	○ Yes	◉ No

Dependencies with (an)other participant(s)

Are there dependencies between your organisation and (an)other participant(s) in this proposal?	○ Yes	◉ No

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

Contact point - Person in charge for participant #11

For the co-ordinator (Participant #1) this person is the one who the Commission will contact in the first instance.

Family name* ***Vanderlinden*** First name(s)* ***Jean-Paul***

Title Prof.

(•) Male ( ) Female

Position in the organisation Professor

Department/Faculty/Institute/Laboratory name/... Observatory of Versailles Saint-Quentin (OVSQ)

Address ☐ Same as legal address

Street name boulevard d'Alembert Number 11

Town Guyancourt Postal Code/Cedex 78280

Country FR

Phone1* + Phone2 +

Fax + E-mail* ***jean-paul.vanderlinden@uvsq.fr***

** Contact details can only be changed by the Proposal Coordinator via the "Step 4 – Manage Your Related Parties" screen.*

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

A3.1.1 Budget #1

UKMO

In FP7, there are different methods for calculating indirect costs. The various options are explained in the guidance notes. Please be aware that not all options are available to all types of organisations.

Method: Actual indirect costs

My legal entity is established in an ICPC and I shall use the lump sum funding method
(If yes, please fill below the lump sum row only. If no, please do not use the lump sum row)

○ Yes ◉ No

Type of Activity

	RTD up to 50 or 75% *	Demonstration up to 50%	Management up to 100%	Other up to 100%	Total
Personnel costs (in €)	260 747 €		64 022 €	0 €	324 769 €
Subcontracting (in €)	0 €		3 000 €	0 €	3 000 €
Other direct costs (in €)	7 500 €		7 500 €	50 000 €	65 000 €
Indirect costs (in €)	152 805 €		51 189 €	5 000 €	208 994 €
Lump sum, flat-rate or scale of unit (option only for ICPC) (in €)					
Total budget (in €)	421 052 €		125 711 €	55 000 €	601 763 €
Requested EC contribution (in €)	210 526 €		125 711 €	55 000 €	391 237 €
Total Receipts (in €)					0 €

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

A3.1.2 Budget #2

ETH Zurich

In FP7, there are different methods for calculating indirect costs. The various options are explained in the guidance notes. Please be aware that not all options are available to all types of organisations.

Method: Specific flat rate 60%

My legal entity is established in an ICPC and I shall use the lump sum funding method
(If yes, please fill below the lump sum row only. If no, please do not use the lump sum row)

○ Yes ◉ No

Type of Activity

	RTD up to 50 or 75% *	Demonstration up to 50%	Management up to 100%	Other up to 100%	Total
Personnel costs (in €)	230 685 €				230 685 €
Subcontracting (in €)			2 917 €		2 917 €
Other direct costs (in €)	15 000 €				15 000 €
Indirect costs (in €)	147 411 €				147 411 €
Lump sum, flat-rate or scale of unit (option only for ICPC) (in €)					
Total budget (in €)	393 096 €		2 917 €		396 013 €
Requested EC contribution (in €)	294 822 €		2 917 €	0 €	297 739 €
Total Receipts (in €)					0 €

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

A3.1.3 Budget #3

CNRS

In FP7, there are different methods for calculating indirect costs. The various options are explained in the guidance notes. Please be aware that not all options are available to all types of organisations.

Method: Specific flat rate 60%

My legal entity is established in an ICPC and I shall use the lump sum funding method
(If yes, please fill below the lump sum row only. If no, please do not use the lump sum row)

○ Yes ◉ No

Type of Activity

	RTD up to 50 or 75% *	Demonstration up to 50%	Management up to 100%	Other up to 100%	Total
Personnel costs (in €)	249 800 €				249 800 €
Subcontracting (in €)	0 €				0 €
Other direct costs (in €)	15 000 €				15 000 €
Indirect costs (in €)	158 880 €				158 880 €
Lump sum, flat-rate or scale of unit (option only for ICPC) (in €)					
Total budget (in €)	423 680 €				423 680 €
Requested EC contribution (in €)	317 760 €				317 760 €
Total Receipts (in €)					0 €

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

A3.1.4 Budget #4

UEDIN

In FP7, there are different methods for calculating indirect costs. The various options are explained in the guidance notes. Please be aware that not all options are available to all types of organisations.

Method: Actual indirect costs using a simplified method

My legal entity is established in an ICPC and I shall use the lump sum funding method
(If yes, please fill below the lump sum row only. If no, please do not use the lump sum row)

○ Yes ◉ No

Type of Activity

	RTD up to 50 or 75% *	Demonstration up to 50%	Management up to 100%	Other up to 100%	Total
Personnel costs (in €)	58 675 €				58 675 €
Subcontracting (in €)	0 €				0 €
Other direct costs (in €)	29 400 €				29 400 €
Indirect costs (in €)	50 791 €				50 791 €
Lump sum, flat-rate or scale of unit (option only for ICPC) (in €)					
Total budget (in €)	138 866 €				138 866 €
Requested EC contribution (in €)	104 149 €	0 €			104 149 €
Total Receipts (in €)					0 €

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

A3.1.5 Budget #5

IC3

In FP7, there are different methods for calculating indirect costs. The various options are explained in the guidance notes. Please be aware that not all options are available to all types of organisations.

Method: Actual indirect costs using a simplified method

My legal entity is established in an ICPC and I shall use the lump sum funding method
(If yes, please fill below the lump sum row only. If no, please do not use the lump sum row)

○ Yes ◉ No

Type of Activity

	RTD up to 50 or 75% *	Demonstration up to 50%	Management up to 100%	Other up to 100%	Total
Personnel costs (in €)	100 000 €				100 000 €
Subcontracting (in €)	0 €				0 €
Other direct costs (in €)	15 000 €				15 000 €
Indirect costs (in €)	69 377 €				69 377 €
Lump sum, flat-rate or scale of unit (option only for ICPC) (in €)					
Total budget (in €)	184 377 €				184 377 €
Requested EC contribution (in €)	138 282 €				138 282 €
Total Receipts (in €)					0 €

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

A3.1.6 Budget #6

DMI

In FP7, there are different methods for calculating indirect costs. The various options are explained in the guidance notes. Please be aware that not all options are available to all types of organisations.

Method: Actual indirect costs

My legal entity is established in an ICPC and I shall use the lump sum funding method
(If yes, please fill below the lump sum row only. If no, please do not use the lump sum row)

○ Yes ◉ No

Type of Activity

	RTD up to 50 or 75% *	Demonstration up to 50%	Management up to 100%	Other up to 100%	Total
Personnel costs (in €)	102 831 €				102 831 €
Subcontracting (in €)	0 €				0 €
Other direct costs (in €)	15 000 €				15 000 €
Indirect costs (in €)	93 319 €				93 319 €
Lump sum, flat-rate or scale of unit (option only for ICPC) (in €)					
Total budget (in €)	211 150 €				211 150 €
Requested EC contribution (in €)	158 362 €				158 362 €
Total Receipts (in €)					0 €

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

A3.1.7 Budget #7

KNMI

In FP7, there are different methods for calculating indirect costs. The various options are explained in the guidance notes. Please be aware that not all options are available to all types of organisations.

Method: Actual indirect costs

My legal entity is established in an ICPC and I shall use the lump sum funding method
(If yes, please fill below the lump sum row only. If no, please do not use the lump sum row)

○ Yes ◉ No

Type of Activity

	RTD up to 50 or 75% *	Demonstration up to 50%	Management up to 100%	Other up to 100%	Total
Personnel costs (in €)	289 745 €				289 745 €
Subcontracting (in €)	0 €				0 €
Other direct costs (in €)	17 500 €				17 500 €
Indirect costs (in €)	279 603 €				279 603 €
Lump sum, flat-rate or scale of unit (option only for ICPC) (in €)					
Total budget (in €)	586 848 €				586 848 €
Requested EC contribution (in €)	440 136 €				440 136 €
Total Receipts (in €)					0 €

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

A3.1.8 Budget #8

UNI READING

In FP7, there are different methods for calculating indirect costs. The various options are explained in the guidance notes. Please be aware that not all options are available to all types of organisations.

Method: Specific flat rate 60%

My legal entity is established in an ICPC and I shall use the lump sum funding method
(If yes, please fill below the lump sum row only. If no, please do not use the lump sum row)

○ Yes ◉ No

Type of Activity

	RTD up to 50 or 75% *	Demonstration up to 50%	Management up to 100%	Other up to 100%	Total
Personnel costs (in €)	170 225 €				170 225 €
Subcontracting (in €)	0 €				0 €
Other direct costs (in €)	23 017 €				23 017 €
Indirect costs (in €)	115 945 €				115 945 €
Lump sum, flat-rate or scale of unit (option only for ICPC) (in €)					
Total budget (in €)	309 187 €				309 187 €
Requested EC contribution (in €)	231 890 €				231 890 €
Total Receipts (in €)					0 €

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

A3.1.9 Budget #9

UOXF

In FP7, there are different methods for calculating indirect costs. The various options are explained in the guidance notes. Please be aware that not all options are available to all types of organisations.

Method: Specific flat rate 60%

My legal entity is established in an ICPC and I shall use the lump sum funding method
(If yes, please fill below the lump sum row only. If no, please do not use the lump sum row)

○ Yes ◉ No

Type of Activity

	RTD up to 50 or 75% *	Demonstration up to 50%	Management up to 100%	Other up to 100%	Total
Personnel costs (in €)	263 539 €				263 539 €
Subcontracting (in €)			2 800 €		2 800 €
Other direct costs (in €)	37 205 €				37 205 €
Indirect costs (in €)	180 446 €				180 446 €
Lump sum, flat-rate or scale of unit (option only for ICPC) (in €)					
Total budget (in €)	481 190 €		2 800 €		483 990 €
Requested EC contribution (in €)	363 710 €		2 800 €		366 510 €
Total Receipts (in €)					0 €

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

A3.1.10 Budget #10

HZG

In FP7, there are different methods for calculating indirect costs. The various options are explained in the guidance notes. Please be aware that not all options are available to all types of organisations.

Method: Actual indirect costs

My legal entity is established in an ICPC and I shall use the lump sum funding method
(If yes, please fill below the lump sum row only. If no, please do not use the lump sum row)

○ Yes ◉ No

Type of Activity

	RTD up to 50 or 75% *	Demonstration up to 50%	Management up to 100%	Other up to 100%	Total
Personnel costs (in €)	226 386 €				226 386 €
Subcontracting (in €)	0 €				0 €
Other direct costs (in €)	24 500 €				24 500 €
Indirect costs (in €)	132 185 €				132 185 €
Lump sum, flat-rate or scale of unit (option only for ICPC) (in €)					
Total budget (in €)	383 071 €				383 071 €
Requested EC contribution (in €)	287 303 €			0 €	287 303 €
Total Receipts (in €)					0 €

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

A3.1.11 Budget #11

UVSQ

In FP7, there are different methods for calculating indirect costs. The various options are explained in the guidance notes. Please be aware that not all options are available to all types of organisations.

Method: Specific flat rate 60%

My legal entity is established in an ICPC and I shall use the lump sum funding method
(If yes, please fill below the lump sum row only. If no, please do not use the lump sum row)

○ Yes ◉ No

Type of Activity

	RTD up to 50 or 75% *	Demonstration up to 50%	Management up to 100%	Other up to 100%	Total
Personnel costs (in €)	187 105 €	0 €	0 €	0 €	187 105 €
Subcontracting (in €)	0 €	0 €	0 €	0 €	0 €
Other direct costs (in €)	28 000 €	0 €	0 €	0 €	28 000 €
Indirect costs (in €)	129 063 €	0 €	0 €	0 €	129 063 €
Lump sum, flat-rate or scale of unit (option only for ICPC) (in €)					
Total budget (in €)	344 168 €	0 €	0 €	0 €	344 168 €
Requested EC contribution (in €)	258 126 €	0 €	0 €	0 €	258 126 €
Total Receipts (in €)					0 €

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

A3.2: Budget

Estimated budget in EUR (whole of the project)

Nr.	Organisation Short Name	Organisation country	RTD	Demonstration	Management	Other	Total	Total receipts	Requested EU contributions
1	UKMO	UK	421 052		125 711	55 000	601 763	0	391 237
2	ETH Zurich	CH	393 096		2 917		396 013	0	297 739
3	CNRS	FR	423 680				423 680	0	317 760
4	UEDIN	UK	138 866				138 866	0	104 149
5	IC3	ES	184 377				184 377	0	138 282
6	DMI	DK	211 150				211 150	0	158 362
7	KNMI	NL	586 848				586 848	0	440 136
8	UNI READING	UK	309 187				309 187	0	231 890
9	UOXF	UK	481 190		2 800		483 990	0	366 510
10	HZG	DE	383 071				383 071	0	287 303

EUROPEAN COMMISSION

7th Framework Programme for
Research, technological
Development and Demonstration

11	UVSQ	FR	344 168	0	0	0	344 168	0	258 126
		Total	3 876 685	0	131 428	55 000	4 063 113	0	2 991 494

FP7-SPACE-2013-1

Part B: Description of Work

Full Project title:	***EU**ropean **CL**imate and weather **E**vents: **I**nterpretation and **A**ttribution*
Project acronym:	*EUCLEIA*
Type of Funding Scheme:	*Collaborative project - medium-scale focused research project*
Work Programme Topics Addressed:	*SPA.2013.1.1-05*
Project Co-ordinator:	*Dr Peter Stott*
Co-ordinating Organisation:	*Met Office*

List of participants:

Participant no. *	Participant organisation name	Country
1 (Coordinator)	Met Office	UK
2	ETH Zurich	Switzerland
3	LSCE	France
4	University of Edinburgh	UK
5	IC3	Spain
6	DMI	Denmark
7	KNMI	Netherlands
8	University of Reading	UK
9	University of Oxford	UK
10	Helmholtz Zentrum Geestacht	Germany
11	UVSQ	France

* *Please use the same participant numbering and participant organisation name as that used in section A2 of the administrative forms*

Table of Contents

Proposal

1: Scientific and/or technical quality, relevant to the topics addressed by the call

1.1 Concept and objectives

Climate change is expected to impact extreme weather, including changes in the frequency of floods, heatwaves and droughts in many parts of the world (Meehl et al, 2007, Seneviratne et al, 2012). Globally there is evidence that an increase in the frequency of warm temperature extremes and a decrease in the frequency of cold temperature extremes have already been observed (Alexander, et al, 2006, Trenberth et al, 2007, Seneviratne et al, 2012). Mounting evidence from across the climate system, including changes in temperatures, precipitation sea ice, snow cover, and oceanic temperature and salinity shows that there is an increasingly remote possibility that climate change is dominated by natural rather than anthropogenic factors (Stott et al, 2010). Regardless of the future trajectory of greenhouse gas emissions, societies already need to adapt to a changing climate, and, given the lags in the climate system's response to changing forcing, are likely to have to adapt to further changes in climate which are locked in and unavoidable.

There is therefore a clear need to adapt effectively to climate change, particularly in Europe, where recent heatwaves (Schär et al., 2004; Beniston, 2004; Barriopedro et al, 2011, Dole et al., 2011), floods (Pall et al. 2011; Christensen and Christensen, 2004) and droughts (Feyen and Dankers, 2009) have demonstrated the vulnerability of European citizens to extreme weather. However, scientifically robust information about the extent to which recent extreme weather can be linked to climate change is often lacking (Schiermeier, 2011) and there is still substantial uncertainty in past trends in droughts and floods, due to methodological issues and to the lack of reliability of relevant observations (Seneviratne et al. 2012, Sheffield et al. 2012). This is important, because if weather-related risks and their possible changes with human influence on climate are not well understood, societies could be adapting poorly to ill conceived perceptions of their vulnerability to climate-related changes in extreme weather.

There is now an excellent opportunity to remedy this situation, because the science of climate attribution is beginning to address the challenge of quantifying the link between climate change and recent extreme weather events (Peterson et al, 2012). It has already been demonstrated that it is possible to estimate attributable changes in climate risks, with studies showing that human influence very likely more than doubled the chances of the European heatwave of 2003 (Stott et al, 2004), increased the risk of floods occurring in England and Wales in Autumn 2000 (Pall et al, 2011) and contributed to an enhanced risk of the Texas heatwave in 2011 (Rupp et al, 2011). But such studies are still thin on the ground, are research based and provide at times apparently contradictory conclusions, as was the case with analyses of the Russian heatwave of 2010 (Dole et al, 2011; Rahmstorf et al, 2011; Otto et al, 2012).

Our vision is to develop a quasi-operational attribution system, well calibrated on a set of test cases for European extreme weather, that will provide to targeted groups of users, well verified, well understood assessments on the extent to which certain weather-related risks have changed due to human influences on climate. The system will include an ensemble of diagnostics that will help better understand the processes driving the events and the reliability of the methodologies used.

This will improve the ability of European businesses, regional and national authorities, and citizens to make effective decisions in climate- and weather-sensitive sectors. It forms a crucial component of the pre-operational capacities in the climate change context of GMES, and should enable the growth of a downstream service sector. It provides an opportunity for Europe to lead the way in developing systems to deliver attribution products. Partners in this consortium are founding members of the international Attribution of Climate-related Events group (ACE), an informal network of scientists recently formed to advance the science needed and to engage with stakeholder groups (Stott et al, WCRP paper). Consequently, while EUCLEIA will concentrate on European weather events, it will draw on expertise and modelling results from collaborative groups from the US, Japan, Australia, and New Zealand, part of a widening network of scientists who are engaged in developing attribution assessments for their region (see letters of

support in Appendix 3). An important new initiative, launched in 2012 and published annually in the Bulletin of the American Meteorological Society, brings together such attribution assessments of the previous year's extreme weather and climate event (Peterson et al, 2012). It is co-edited by the EUCLEIA coordinator, and, alongside more user-targeted fora, and the standard peer-reviewed literature, we see this high profile peer-reviewed annual report as a major opportunity for us to demonstrate the impact and value of the attribution products developed under EUCLEIA (see also letter of support in Appendix 3 from Dr Thomas Peterson, lead author and editor of the *Bulletin of the American Meteorological Society* paper Explaining Extreme Events of [the previous year] from a Climate Perspective.)

In ancient Greek mythology, Eucleia was the ancient Greek female spirit of glory and good repute. As such she stands as a fitting representative of our endeavour, to enable Europe to lead the world in the development of attribution products that, because of the careful and thorough nature of their development as described in this project, are of exceptionally good repute, providing information on which commercial and policy users can rely for their weather sensitive decision making.

Objectives
EUCLEIA has 5 top level objectives each of which are associated with project milestones and deliverables as follows and which map directly onto the 5 Work Packages

1) Derive the requirements that targeted user groups (including regional stakeholders, re-insurance companies, general public/media) have from attribution products and demonstrate the value to these users of the attribution products developed under EUCLEIA (WP1)
2) Develop experimental designs and clear ways of framing attribution studies in such a way that attribution products provide a fair reflection of current evidence on attributable risk. (WP2)
3) Develop the methodology for representing the level of confidence in attribution results so that attribution products can be trusted to inform decision making (WP3)
4) Demonstrate the utility of the attribution system on a set of test cases of European weather extremes (WP4)
5) Produce traceable and consistent attribution assessments on European climate and weather extremes on a range of timescales; on a fast-track basis in the immediate aftermath of extreme events, on a seasonal basis to our stakeholder groups, and annually to the BAMS attribution supplement (WP5).

These objectives relate to the topics addressed by the call as follows :

- By producing evidence for whether the risk of similar events to those that have occurred in Europe has increased, decreased or remained stable (WP4 for test cases, WP5 for ongoing evaluation in near-real time)
- By studying a number of historical cases, related to flooding, droughts and storm surge events (WP4)
- By proposing exhaustive diagnostics of driving climate processes of events under study in order to properly evaluate the attribution system's ability to simulate them and deliver user-relevant products together with appropriate reliability assessments (WP3)
- By identifying those types of events where the science is too uncertain and observations insufficient to make a robust assessment of attributable risk (WP3,4,5)
- By delivering a quasi-operational system that contributes significantly to the pre-operational capacities in the climate context of GMES by providing regularly updated, reliably calibrated information on the extent to which extreme weather and climate events are attributable to natural and anthropogenic factors. (WP5)
- By facilitating the development of climate adaptation strategies through working with stakeholder groups representing both commercial activities (insurance industry) and policy initiatives (regional managers, public). (WP1)

A key feature of the proposed approach is that it will start from stakeholder needs in developing and delivering attribution products. It will benefit considerably from international efforts to develop the underpinning science and to engage stakeholders. Many of the partners in this consortium are active

participants in the long running International ad-hoc Detection and Attribution group (IDAG), which has over many years developed the science of detection and attribution and produced review papers summarising the progress in the field (IDAG, 2005; Stott et al, 2010) and which strongly supports EUCLEIA (see letter of support in Appendix 3). The Attribution of Climate-related Events (ACE) group was formed at the IDAG meeting of 2009. It held its first meeting of scientists and stakeholders in August, 2010 in Broomfield, Colorado, USA and its second meeting in Oxford, UK in September, 2012 and it is envisaged that future meetings will be held on an annual basis and will involve a substantial contribution from EUCLEIA (see also letters of support from ACE collaborators in Appendix 3). Crucially also, the project has close links with the development of seasonal climate forecasting as represented by the EUPORIAS and SPEC consortia and through the involvement of groups at the Met Office and EC-Earth. In addition, it also has close links to the EU-FP7 project DROUGHT-RSPI, which develops hydrological forecasting methodologies for droughts. The project will also benefit from the experience and data acquired from recent new Climate Model Intercomparison Project (CMIP5) simulations, and from several recently developed international in situ and remote sensing observation data sets. Seasonal forecasting is closely tied to the development of attribution systems, both in the aspect of model verification, a crucial aspect of both activities, and in the aspect of putting extreme weather into the long term context of climate variability and change. Our attribution system will be based on the model used for the Met Office seasonal forecasting, maximising the mutual benefit to both attribution and seasonal forecasting endeavours.

How will these objectives be met?
Central to the success of the project is the role of the **stakeholders** who will provide the starting point from a user/decision maker's perspective and who will be engaged closely throughout the development of attribution products. WP1 led by HZG will focus on two case studies concerning regional publics and stakeholders in the Ile de France and the German Baltic Sea coast regions in order to provide in depth analyses of German and French speaking stakeholders concerned with the effects of heatwaves and droughts in central France and storm surges along the Baltic coast. Selecting case studies in this way will provide the focus needed to identify specific ways in which the attribution products developed can better meet user needs. In addition there will be a focus on the insurance industry, a key stakeholder concerned with robust characterisation of weather and climate-related risks. Following on from discussions at the ACE meeting in Oxford in September, 2012, which involved representatives of the insurance industry, we have identified suitable stakeholders to represent their interests and to help guide the development of attribution products to meet needs of key sectors (see supporting letters in Appendix 3). This will meet objective 1.

WP2, led by the University of Oxford, will explore the impact of methodological choices and framing of the attribution problem to ensure that attribution products provide a **fair reflection of the current evidence** on attributable risk of extreme weather and climate events. This WP will consider both statistical and dynamical approaches. The former will allow a fast track response in the days immediately following an extreme weather or climate event and statistical methodologies for comparing recent climate events with past events will be developed in this WP. The latter will be based on a core suite of HadGEM3-A simulations, the model configuration maintained to be using the same atmospheric model as the Met Office seasonal forecasting system). The basic design involves comparing simulations of models with observed sea surface temperatures (SSTs), with simulations with alternative SSTs representing possible alternative realities in which particular anthropogenic or natural drivers are absent. From these simulations, estimates of the changed risk of particular events can be calculated. This WP will explore the sensitivity of attribution results to a range of framing issues, experimental design including model ensemble size, model resolution, and to the representation of ocean-atmosphere interactions. The effects of model structure will be investigated by comparing results from the core model, HadGEM3-A model with the EC-Earth model. The consistency of results based on dynamical and statistical approaches will be assessed. As a result of these methodological developments and sensitivity studies this WP will build a robust basis for the construction of attribution products that fairly represent current weather and climate risks. This will meet objective 2.

The third work package, WP3, led by CNRS, is the centre piece and fulcrum of EUCLEIA. It develops key ingredients on which **trust in attribution products** will be based. Trust relies on users being able to understand the extent to which attribution products are based on reliable and robust assessments of weather

and climate risk. This in its turn depends on an objective analysis of the models being used to generate attribution products and their ability to simulate the development of the various classes of extreme weather and climate events being assessed. To do this WP3 will develop a comprehensive set of diagnostics that characterise the key physical processes involved in the development of the events and will develop quantitative measures of the reliability of the dynamical attribution system based on techniques used in seasonal forecast verification. WP3 will develop rules to produce confidence levels for assessments, based on calibrated language, which will enable a user to understand the extent to which they should place trust in attribution products. This will meet objective 3.

WP4, led by KNMI, will demonstrate the **utility of the attribution system** by carrying out a set of attribution assessments of chosen **test cases** to include examples from the recent past of heat waves, cold spells, floods, droughts, and storm surges. The diagnostics developed in WP3 will be applied within both fast track statistically based methods and within the HadGEM3-A based dynamical attribution system. Lessons learned will be incorporated into the further development in WP5 of the quasi-operational attribution system. By considering specific case studies of extreme weather and climate events observed in recent years this WP will demonstrate the utility of a quasi-operational attribution system. This will meet objective 4.

WP5 led by the UK Met Office will develop **a quasi-operational attribution system** and will apply it to provide fast-track assessments in the week following weather and climate events, assessments at the end of each season based on the HadGEM3-A attribution system, and assessments of the main extreme events of the previous year delivered to the annual BAMS report putting such events into the context of climate variability and change. WP5 will be informed by the user perspective investigated by WP1, will use tools developed in WP2, will apply evaluation methodologies from WP3 to quantify the reliability of the results, and will apply lessons learned from the case studies in WP4. The developments made in EUCLEIA will enable the currently long timescales (typically of the order of several years) needed to provide scientifically robust and reliable information after an event occurs to be significantly shortened. As a result, WP5 will provide a (pre-) operational capacity to deliver attribution products on a regular basis. This will meet objective 5.

1.2 Progress beyond the state-of-the-art

The state of the art

While research into the causes of global and regional trends in temperature and other climate variables is well advanced, as represented by the increasing degree of confidence in attributing warming since the mid 20th century to human influence in successive IPCC reports (Santer et al, 1996; Mitchell et al, 2001; Hegerl et al, 2007), the science of attribution of individual extreme weather events is relatively new, as highlighted in the recent IPCC SREX report (Seneviratne et al. 2012). While it isn't possible to say definitively that an individual weather event was or was not due to climate change (because it is hard to conceive of any particular weather event that would have been impossible today if human activities had not altered climate) it is possible to calculate the extent to which human and natural influences on climate have altered the odds of a particular type of weather event occurring (Allen, 2003). The utility of this approach was demonstrated in a study of the European heatwave of 2003, a devastatingly hot summer that is estimated to have led to between 22,000 and 35,000 heat related deaths across Europe and from the associated drought to around US$12.4 billion of uninsured crop losses and extensive damage from forest fires (Schar et al, 2004). This first attribution study of an individual climate event concluded that it is very likely (confidence level > 90%) that human influence had at least doubled the risk of extreme summer temperatures throughout Europe of the magnitude of 2003 (Stott et al, 2004). This was based on the principle of analysing climate model simulations including both anthropogenic and natural forcings to represent the conditions of the world we live in and alternative climate model simulations including only natural factors, to represent the world we might have had, had there not been human influence on the climate. While further studies have extended this approach for temperature-related events in other regions (Christidis et al., 2012a; Christidis et al., 2012b) applying a similar approach to other variables such as precipitation, and to more impact relevant quantities, such as short duration heatwaves, floods, droughts and storm surges, remains challenging. This is largely because small scale processes developing over small time scales are not adequately represented by climate models which typically run at a coarser resolution. Such is for instance the case in heavy precipitation events

where cloud processes are crucial. Also, the land-atmosphere exchanges of heat and water are rather poorly covered by observations (Seneviratne et al. 2010, Teuling et al. 2010), leaving climate models surface fluxes poorly constrained (de Noblet-Ducoudré et al., 2012; Stegehuis et al., 2012). Such interactions have been shown to be determinant in the development of droughts and heatwaves (Seneviratne et al. 2006, Vautard et al. 2007, Diffenbaugh et al. 2007, Hirschi et al. 2011, Quesada et al. 2012, Mueller and Seneviratne 2012).

A new approach that has been taken is to run atmosphere only models in order to constrain the conditions to those pertaining in a particular season to the actual observed sea surface temperatures and in order to allow higher resolution and larger ensembles. This approach was taken in an analysis of the floods in England and Wales in Autumn 2000 which damaged nearly 10,000 properties and caused insured losses estimated at £1.3 billion (Association of British Insurers, 2001; DEFRA, 2001, Pall et al, 2011). Model results from this study indicated that anthropogenic greenhouse gas emissions had increased the risk of the floods occurring by more than 20% in 9 out of 10 cases and in two out of three cases by more than 90%.

In the first BAMS report "Explaining extreme events of 2011 from a climate perspective" (Peterson et al, 2011), similar types of studies found that human influence substantially altered the probabilities of the Texas heatwave of that year, the very warm temperatures seen in the UK that November and the very cold start to the British winter of 2010/11. In addition, the report considered other techniques, notably an analysis of European temperatures comparing observed temperatures with those expected during circulation analogues (Yiou et al., 2008; Vautard and Yiou, 2009) of past decades (Cattiaux and Yiou, 2012). This analysis showed that temperatures in 2011 were distinctly warmer than expected from flow analogues. While 2011 was the warmest in Western Europe since 1948, the analysis showed that it would have been an unexceptional year based on the circulation characteristics of that year without long-term warming. In addition the report contained an analysis of the Thailand floods of 2011 which considered observed diagnotics of rainfall and concluded that while the flooding on the Chao Phraya river was unprecedented, the rainfall was not very unusual, indicating that non climate factors were more important in setting the scale of the disaster (van Olderborgh, 2012). Such observationally based analyses provide a method for putting recent extreme events into the context of climate variability and change which can be applied very quickly in the days following the event in question.

Such studies indicate that by using suitably designed ensembles of climate model simulations and more empirically-based methods it is possible to put recent extreme weather events into the context of climate variability and change and to calculate any changed risk of recent events that is attributable to human and natural influences on climate. Such attribution assessments arouse major interest in the media and from policy makers and only two months after it was published the first BAMS attribution report (Peterson et al, 2012) was already the most read American Meteorological Society paper of the last year, indicating that there is a great appetite for such information (Nature, 2011).

Main limitations at present.
To date, event specific attribution studies have only been attempted for a relatively small number of specific cases. Because the details of the methodologies are often being developed at the same time as the analysis being undertaken it can take a long time for the results to come to fruition, (eg the assessment by Pall, 2011 of 2000 UK floods). Different approaches have been used, including simple statistical approaches, and a range of different climate modelling strategies, and how results from different approaches relate is not well understood. Consequently, contributions to the first BAMS annual attribution supplement on extreme weather and climate events of 2011 (Peterson et al, 2012) were few in number, used studies that required the use of simplifying assumptions in order to generate results in time for publication, and were difficult to relate to each other because of the diversity of approaches taken.

Even amongst the relatively small number of studies already published, there are apparently conflicting results appearing for the same event, as was the case for the Russian heatwave of 2010, natural variability being blamed in one case (Dole et al, 2011) and human influence in another (Rahmstorf et al, 2011) as the major contributory factors. A demonstration that these different results can be reconciled once it is recognised that they are seeking to explain different aspects of the heatwave, its magnitude in the former

case, and its probability in the latter (Otto et al, 2012), points to the need for careful framing of attribution questions so that they are seen to fairly reflect the current state of evidence. The lack of such a framework continues to lead to public confusion, with a consequent risk to the credibility of attribution science.

A further risk to the credibility of attribution products is if they are based on inadequate models that generate results that are not robust. Attribution studies inherently rely on models (statistically or physically based) to generate counterfactual worlds from which to estimate attributable changes in weather risks. At present, many model-based attribution assessments rely heavily on "perfect model" assumptions, and while model biases may be openly discussed in such studies (eg Rupp et al, 2012), the methodologies are often lacking to link model biases to the levels of confidence that can be assigned to particular attribution statements. Some initial work has demonstrate the potential for using reliability measures from seasonal forecasting to characterise the robustness of attribution results (Chrisitidis et al, 2012c) but it isn't clear how to translate such measures into overall confidence statements. Crucially, verification of models used for attribution requires process-based approaches that diagnose the mechanisms behind a particular event in order to understand whether they are represented in the models used. For instance, soil moisture-climate interactions play an important role for the occurrence of drought and heatwaves in several regions (Seneviratne et al. 2010, Mueller and Seneviratne 2012), but current models strongly vary in their representation of the relevant underlying processes (Koster et al. 2004, Boe and Terray 2008, Quesada et al. 2012), and in some cases even display shared biases (Hirschi et al. 2011). Without sufficient mechanistic understanding, it will remain unclear where attribution science is still too uncertain to make robust assessments of change in risk, clarity on which aspect is needed for determining future research needs.

Biases and poor sampling in observational datasets also affect robustness of attribution studies, yet this aspect remains poorly assessed. Observational records of sufficient length and quality are often lacking in many regions even for temperature and precipitation (Alexander et al. 2006). Furthermore, the lack of data is particularly critical for non-meteorological variables such as soil moisture or runoff (Seneviratne et al. 2012), or energy and water surface budgets which are directly related to high-impact events such as droughts and floods. Even though Europe is relatively fortunate in having available datasets such as the ECA&D dataset for temperature and precipitation, data products coming out of the Euro4m project, space information being developed under the ESA CCI (e.g. for surface soil moisture), there is a lack of extensive observationally based diagnostics to evaluate climate models for attribution, and some satellite-based datasets also need to be evaluated for their suitability for climate applications (for instance a first version of the WACMOS/ESA CCI soil moisture dataset has only been released in 2012, and the validation and evaluation of this dataset for drought diagnostics is still underway). Such diagnostics need to be targeted at the atmospheric and land surface processes most closely involved in the development of the climate or weather extreme in question.

Last and most importantly, while attribution assessments of individual weather and climate events have attracted considerable media attention (eg Stott et al, 2004, Dole et al, 2011, Peterson et al, 2012), and a diverse range of user groups, including policy makers, reinsurance companies and legal experts, expressed an interest in obtaining such information at the Attribution of Climate-related Events meeting in September, 2012, the full set of requirement of such stakeholders for attribution products has not yet been properly elucidated. As a result, the tolerance of potential decision-making processes to uncertainties and possible errors in attribution assessments is not yet well understood.

All of the above individual limitations add to one over-riding limitation, namely that a central plank of climate services that links monitoring and prediction services, that of attribution services (Trenberth,2008) [http://www.cgd.ucar.edu/cas/Trenberth/trenberth.papers/WMO-BullJan08.pdf] remains under-developed relative to its sister components. EUCLEIA aims to address this limitation.

EUCLEIA will move beyond the state of the art in

1. Identification of user needs. By engaging with targeted groups of stakeholders in a systematic and comprehensive fashion from start to finish of the project, EUCLEIA will demonstrate the value of attribution products for European decision makers. Starting with an in depth assessment of user

requirements from stakeholder groups, attribution products will be designed to meet user needs and their utility will be assessed based on a carefully chosen set of test cases of past extreme weather and climate events.

2. Development of a set of methodologies for the production of regular, reliable attribution products. This will include the development of a suite of statistically-based and climate-model based methodologies that can be applied in a regular and routine basis. An important component is the provision of a set of robust methodologies for calibrating confidence levels of assessments. A suite of verification tools will be developed for statistical and physically based models, including those used in seasonal forecasting models. The outcome will be the provision of calibrated confidence levels for assessments (analogous to those used in IPCC assessments), based on sound physical principles and communicated in such a way as to be of value for users in their decision making processes.
3. Provision of a quasi-operational attribution system. The centre piece of this system will be the HadGEM3-A climate model, running at seasonal forecast resolution (links to SPECS, EURPORIAS) and delivering results each season and annually for publication in the BAMS report putting extreme events of the previous year into the context of climate variability and change In addition, a system for delivery of statistically-based analyses of observationally based information and for calculation of attribution products based on pre-existing coupled model simulations from the CMIP5 archive for "fast-track" services in the days following events will also be developed.
4. Development of comprehensive and transparent analyses of the effects of methodological choices. This will permit clear user-focused communication of the significance of such choices and of the overall faming of the attribution problem. An important aspect of this will be to ensure traceability between the different components of the attribution system so as to ensure consistency of treatment and robustness between fast-track and seasonal to annual timescale results.
5. Development of an extensive suite of process-based diagnostics. The diagnostics developed by EUCLEIA will be targeted at the key mechanisms responsible for the types of weather and climate events considered and will be used in model verification as well as in the provision of user-focused attribution assessments. EUCLEIA will exploit links to other European projects developing in-situ and satellite based observational datasets including the ESA Climate Change Initiative (CCI; of which the Met Office leads the Climate Modelling User Group), Euro4m, and [what else?].
6. Identification of those areas where attribution science is still too uncertain to make a robust assessment of change in risk. In pointing the way towards the limitations in current attribution systems, EUCLEIA will seek to minimise over-reliance of user groups on contingent information, as well as inform future research priorities. The understanding gained in EUCLEIA on the limitations of current attribution systems will facilitate the further development of the next generation of attribution systems.
7. Identification of observational gaps and needs for improving attribution. EUCLEIA will identify the variables, frequency and spatial coverage needed for the events under study. The observables discuss will both help in the detection of changes and in the evaluation of model's ability to reproduce key processes involved in the events.

1.3 S/T methodology and associated work plan

1.3.1 Overall strategy and general description

The aim of EUCLEIA is to develop a quasi-operational attribution system for the delivery of attribution products on a series of timescales following weather and climate events (fast track in the week following the event, each season disseminated to the EUCLEIA stakeholder group, and annually to the BAMS annual attribution supplement). The project starts by defining user needs in WP1 and runs through to the delivery of attribution products in near-real time in WP5. Recognising the core role of users and the development and delivery of the operational attribution system, WP1 and WP5 form the outer skeleton of EUCLEIA. Methodological development is carried out in WP2 and the development of diagnostics, model evaluation and the development of reliability assessments is carried out in WP3. The outputs of WP2 and 3 will be used in the course of a set of test cases on 5 types of weather event in WP4, informed by the user requirements developed in WP1 and using the attribution system developed inWP5. Finally in the last year of the project, the attribution system developed in EUCLEIA will be run regularly, in quasi-operational mode, to produce

attribution products related to weather and climate events as they happen in Europe. This last component of WP5 draws together all the elements developed in the other WPs in EUCLEIA and includes dissemination and feedback from users to inform the next steps in the development of fully operational attribution systems.

A set of case studies are identified in WP4 which include some notable weather and climate events seen in Europe in recent years, including heatwaves, cold spells, floods, droughts and storm surges. We choose to restrict EUCLEIA to five classes of events in order to allow sufficient depth of analysis of the value and limitations of the attribution system for each of these types of event. In addition, we concentrate on Europe to ensure that EUCLEIA focuses, both from the science and stakeholder perspective, on its core mission of development of attribution services for our region. However EUCLEIA will also work very closely with international partners from other continents including US, Australasia, Africa and Asia actively engaged in developing attribution science. Moreover the methodology, and most of the diagnostics will be applicable to other regions, so EUCLEIA will be a flagship project with a potential for worldwide development. This is particularly important in the current stage of construction of the Global Framework for Climate Services. We will be able to compare results from different models when applied to different regions, discuss the development of methodologies, and collaboration with our international group of EUCLEIA partners (funded for attendance at annual EUCLEIA meetings) will enable us to incorporate international best practice in the science of event attribution into our endeavour.

The generation of sensitivity studies is required to inform the development of reliable attribution systems. Sensitivity studies on methodological choices are carried out in WP2 and sensitivity studies to elucidate the role of different mechanisms in the classes of events we study are carried out in WP3.

Throughout the project, significant effort will be put into outreach and dissemination of project findings, to stakeholders, to the scientific community and to the general public. We will discuss our latest results with stakeholder groups seasonally, will input results to the annual BAMS attribution report, will submit papers to the peer-reviewed literature, and will present results at scientific conferences and workshops (including IDAG, ACE, AGU, AMS). Suitable results from peer reviewed publications, including the BAMS annual attribution supplement, will be disseminated to the public via press offices and the external EUCLEIA website.

1.3.1.1 Data flow

EUCLEIA will incorporate observational and model information generated outside the project but will also generate a substantial amount of data from climate model simulations generated internally. The diagram below shows schematically how data is expected to be distributed to the different WPs. Relevant information from observational and reanalyses and model information from the CMIP5 archive and from EC-Earth will be acquired by WP2 for use in testing the sensitivity of attribution results to model structure and in the development of “fast track” attribution methodologies applied to observational and CMIP5 model data. Climate model data generated by WP2 is then distributed to WP3 for the development of diagnostics and for model evaluation techniques. The diagnostics and reliability measures developed in WP3 flow in to WP4 where they are applied to a set of test cases. Information from these test cases is then used to inform the development of the quasi-operational attribution system in WP5. Suitable results from WP4 and WP5 will contribute to the BAMS attribution report on extreme events of the previous year in the last year of the project. Output from WP5 is also used to deliver attribution products to stakeholders via WP1 as part of a quasi-operational attribution service. Finally results produced by WP5 will be compared with sensitivity studies carried out in WP2 to understand the sensitivity of results to model structure.

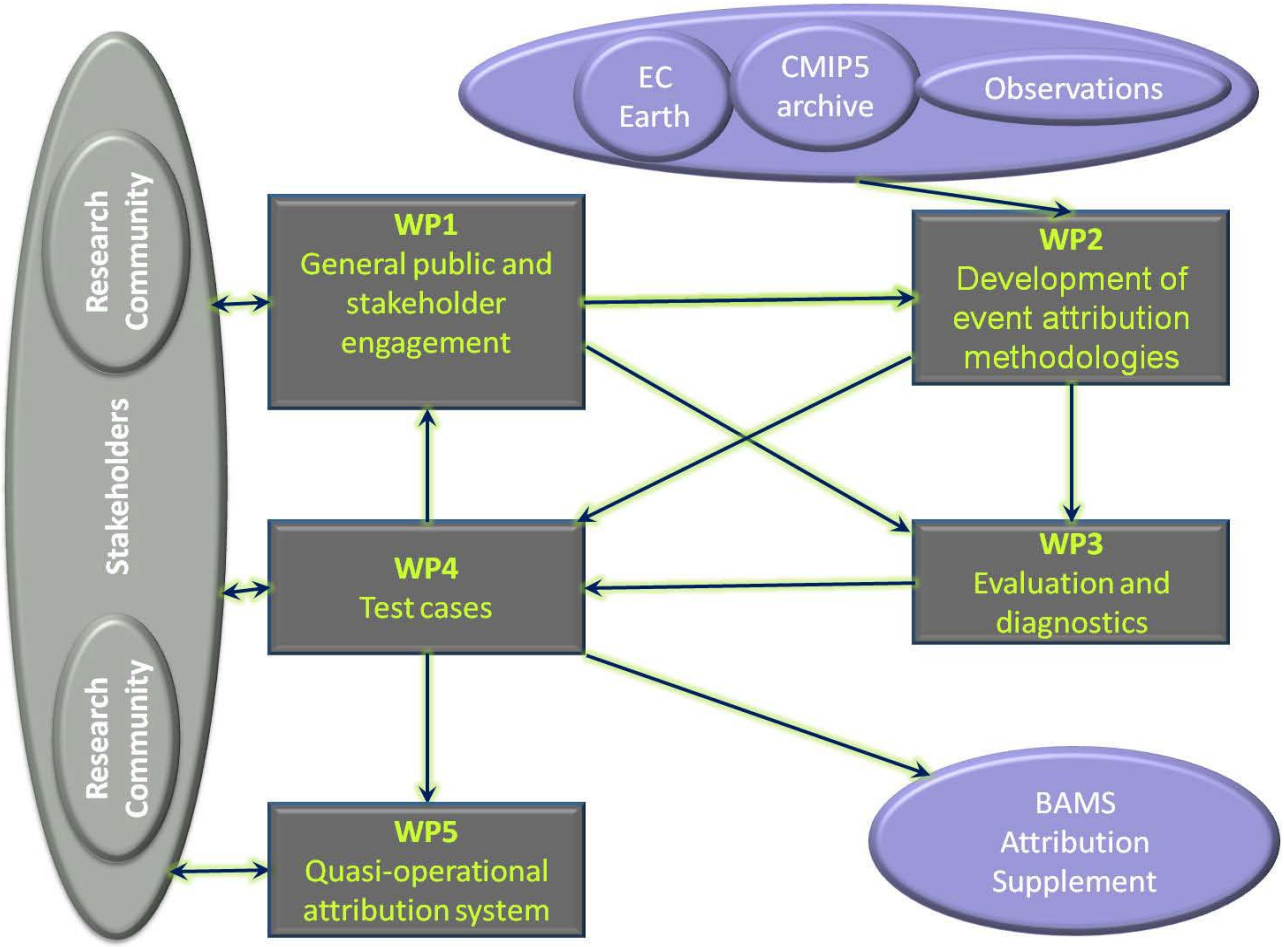


Figure 1EUCLEIA Data Flow

1.3.1.2 Graphical presentation of the components showing their interdependencies

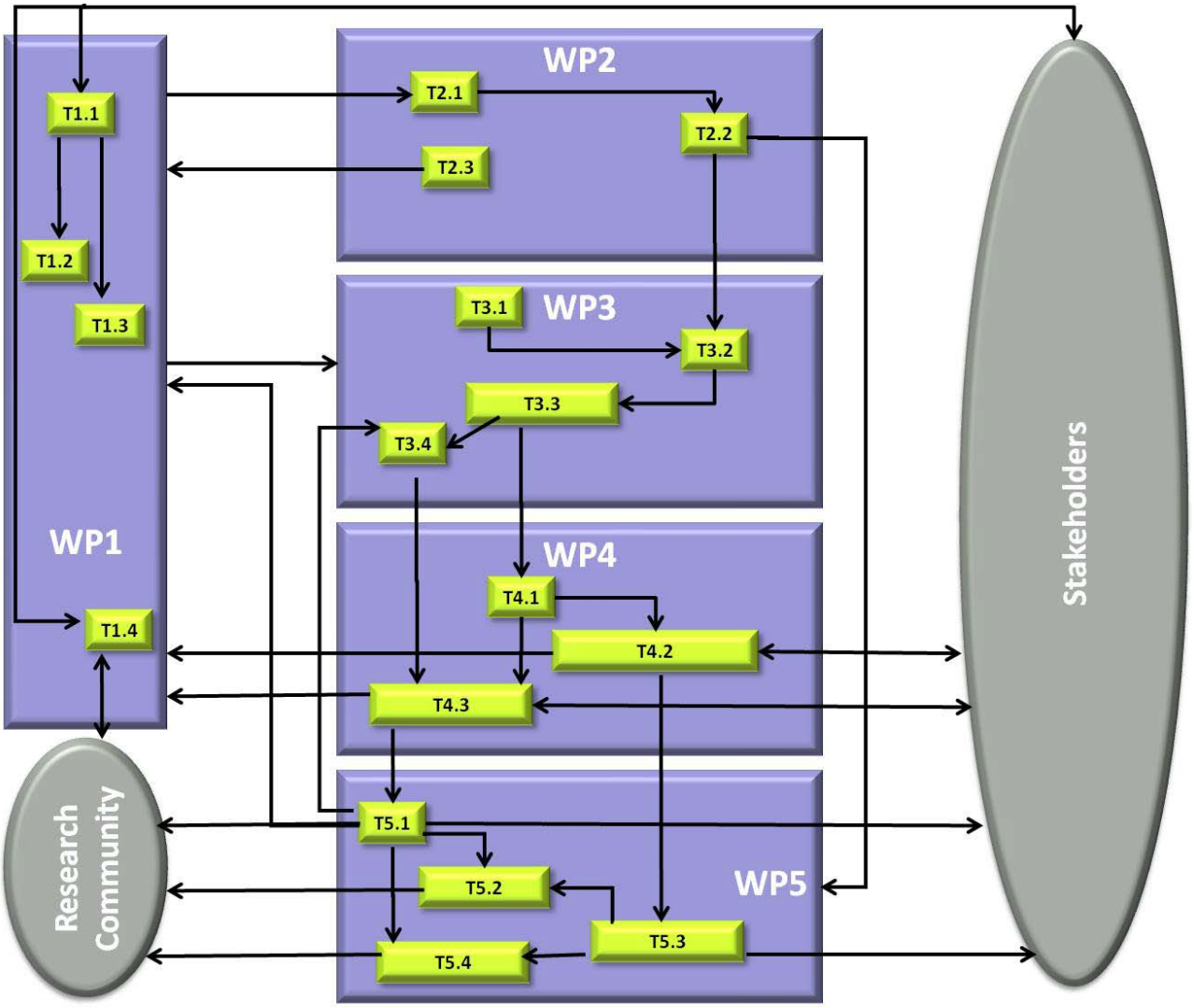


Figure 2 EUCLEIA Interdependencies Schematic

1.3.1.3 Significant risks and associated contingency plans

EUCLEIA, like all projects, is susceptible to risks, arising from the ambitious (but realistic) objectives, inherent risks associated with undertaking research, and by breaking new ground in developing a quasi-operational attribution service.

The Met Office has developed expertise in the management of risks in this context through other large projects such as ENSEMBLES and EUPORIAS. The Project Office, supported by the Met Office's Risk Manager, will draw on the knowledge and experience of partners within the consortium and will ensure that risks within EUCLEIA are managed effectively through the project.

Within EUCLEIA, risks can be categorised into financial, scientific, and managerial. The significant risks and associated contingency plans are described below.

Financial risks

While unlikely to occur, should any partners be under such financial difficulties that they need to withdraw from the consortium, a process for replacing partners or re-allocating the work that would have been done by the partner who has left is all part of the formal consortium agreement phase.

Scientific risks

The development of novel attribution systems based on development and application of cutting edge methodologies and the use of state of the art climate models is an important element of EUCLEIA. The

model that will form the core of the project, HadGEM3-A, has already been developed for use in producing event attribution results, thus demonstrating the feasibility of the basic design of the quasi-operational attribution system proposed. Further developments will be needed to increase the resolution and to automate the production of model simulations. The risks to delays in this development will be mitigated by close collaboration with the seasonal forecasting team at the Met Office and by ensuring that the attribution system uses the same atmospheric component as the seasonal forecasting model and is kept up to date with the latest developments in the seasonal forecasting model. Likewise, the feasibility of the empirical methods proposed for use in fast-track assessments has already been demonstrated in the first BAMS attribution report produced in 2012. This therefore minimises the risk that such methods will not be available for use in EUCLEIA, although clearly the ambition of the project is to make substantial developments in the sophistication of such methods and to apply them to a much wider range of extreme weather and climate situations. We will help to ensure the scientific integrity of the project by presenting our results to collaborators in the ACE and IDAG groups and through submitting our work to peer review. A small advisory board, drawn from scientific experts who are members of IDAG, will provide independent advice and recommendations about improvements to the projects work plans and techniques, thereby minimising the risk of the project going off track in its development of new methodologies and approaches.

In breaking new ground in making attribution assessments of a much wider range of extreme weather and climate events, and on a much faster timescale than hitherto, there is a risk that some attribution results produced by EUCLEIA could be misused in some way. For example, there is already a history of media reports jumping to conclusions about human induced climate change being definitely responsible, or not responsible, for certain extreme weather events that have occurred in recent years. The risk of inappropriate misuse of attribution results from EUCLEIA will be minimised through two key elements of EUCLEIA. First, a principle driver of EUCLEIA is to develop the methodologies needed to be able to communicate the level of trust users can have in attribution results for their application, and to understand the impact of methodological choices so that attribution assessments developed in EUCLEIA are seen to provide a fair reflection of the current evidence. Second, results from EUCLEIA will be carefully disseminated. Results will only be published if the methodologies being employed have passed peer review. Furthermore we will take advantage of the close involvement of stakeholders at all stages in the project to minimise the risk of misuse and misinterpretation of results. Initial results from the quasi-operational attribution system will be disseminated to the stakeholder group, so that we can fully understand the issues of interpretation, and thereby minimise the risk of misuse and misinterpretation of results. It is important to stress that we do not intend to provide a fully operational attribution service as part of EUCLEIA providing all results direct to the public, because the risks of misinterpretation and therefore to the long-term credibility of event attribution science, if results are put out unmediated are simply too great. Rather, by developing a quasi-operational attribution system, by testing it out on recent extreme weather and climate events, and through careful dissemination of the results, we intend to lay the ground work for a fully operational attribution capability for Europe as part of the future development of climate services.

Managerial risks
EUCLEIA brings together a group of internationally renowned climate experts and their teams to work on an exciting and innovative project. Partners will work together to assist any partners that need to recruit people to work on the project.

The Coordinator can draw on considerable experience at the Met Office in running large FP projects and will have access to a wealth of experience from partners during the operation of EUCLEIA. The management structure has been clearly set out in Part B2.1 to ensure that EUCLEIA will minimise the project management risks, such as delays to Work Packages and Tasks.

There is a risk regarding the management of personal data. The SIMG will be tasked with overseeing the management of personal and private data to ensure that the data is managed in accordance with EU guidelines and rules.

The recruitment and retention of suitably experienced researchers and stakeholders could be a risk. The project has already identified the leaders in the development of event attribution science in Europe, has recruited the leading scientists throughout the rest of the World to participate as non-funded partners, and has identified a critical mass of stakeholders needed to make the project successful. While recruitment of additional stakeholders may strengthen the project it is retention of stakeholders that is the biggest risk. This will be mitigated by using existing contacts to enthuse and recruit stakeholders. The risk of not retaining stakeholders will be mitigated by ensuring they are fully engaged with the project throughout.

During the consortium agreement phase, a comprehensive risks register will be created along with appropriate management of the risks. Whilst in general, consideration will be given to reducing the risks through mitigation strategies, ultimately the identified risks will be retained and monitored. However, consideration will have to be given to avoiding and sharing risks where appropriate.

1.3.2 Gantt chart

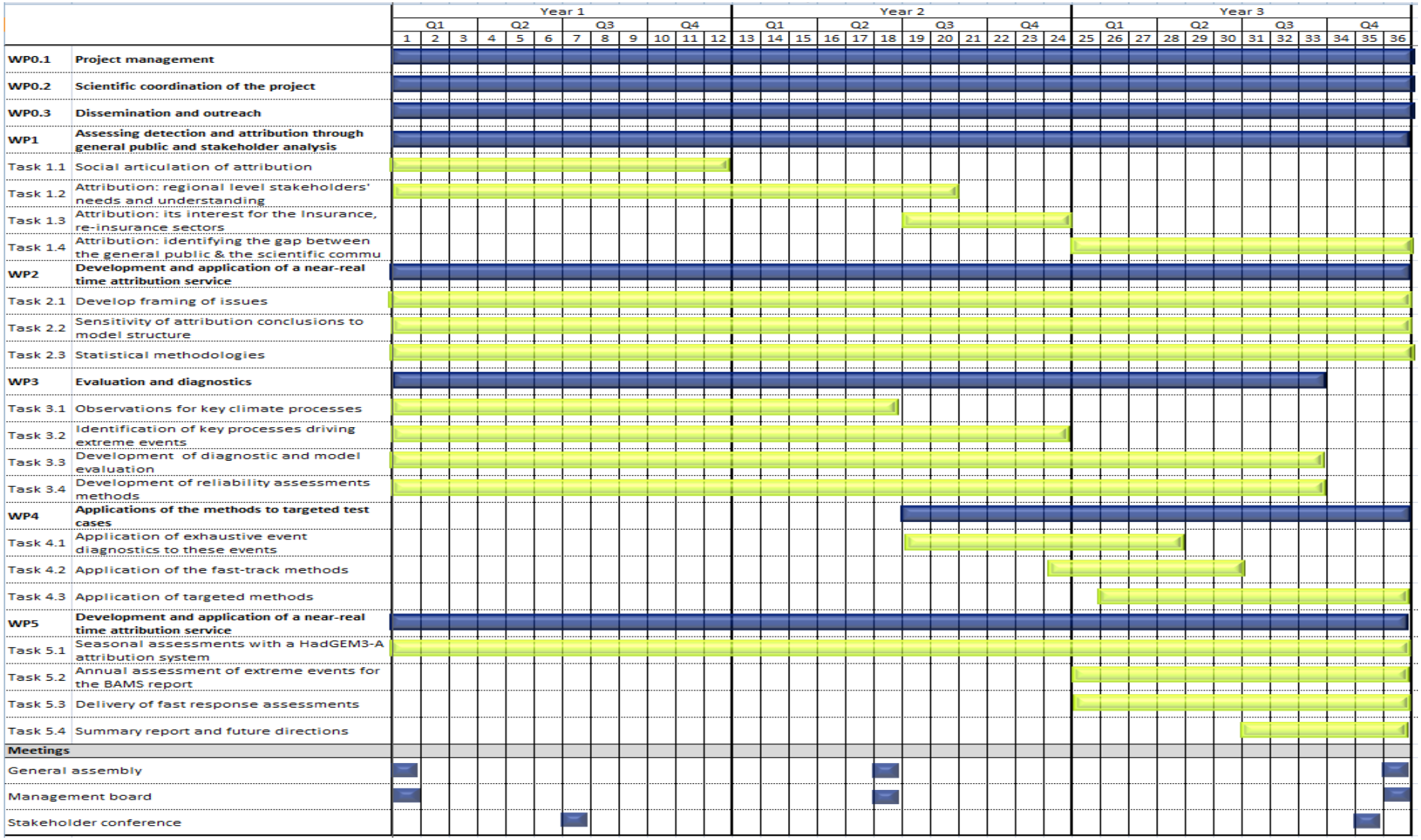


Table 1.3 a: Work package list

Work package No[1]	Work package title	Type of activity[2]	Lead participant No[3]	Lead participant short name	Person-months[4]	Start month[5]	End month
0.1	Management	MGT	1	MET OFFICE	18	1	36
0.2	Science Coordination	Other	1	MET OFFICE	3	1	36
0.3	Dissemination	RTD	1	MET OFFICE	3 in kind	1	36
1	Development of the Science needed for interpretation of results	RTD	10	HZG	68	1	36
2	Development of Attribution Systems including methodology and framing	RTD	9	UOXF	93	1	36
3	Evaluation and diagnostics	RTD	3	CNRS-LSCE	106	1	33
4	Applications including targeted test cases and comparison of methodologies	RTD	7	KNMI	67	6	36
5	Development and application of a real-near time attribution service	RTD	1	MET OFFICE	54	1	36
				TOTAL	409		

[1] Work package number: WP 1 – WP n.
[2] Please indicate one activity per work package: RTD = Research and technological development (; DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities.
[3] Number of the participant leading the work in this work package.
[4] The total number of person-months allocated to each work package.
[5] Measured in months from the project start date (month 1).

Table 1.3 b: Deliverables List

Del. no. [6]	Deliverable name	WP no.	Nature[7]	Dissemination level[8]	Delivery date[9]
D0.1.1	Internal project website	0.1	O	CO	3
D0.3.1	Project Information Pack	0.3	O	PU	3
D0.3.2	Updated Dissemination Plan	0.3	R	PP	3
D0.3.3	External project website	0.3	O	PU	3
D1.1	Theoretical Working Paper on the conceptual foundations of exploring the social articulation of attribution	1	R	PU	12
D1.2	Empirical Working Paper analysing stekeholders' needs and understanding for two case study events	1	R	PU	20
D1.3	Empirical Working Paper on the commercial dimension of attribution products using (re-)insurance sectors as a proxy	1	R	PU	24
D1.4	Empirical Working Paper on perceiving attribution: gaps between the general public and scientists	1	R	PU	35
D1.5	WP synthesis report	1	R	PU	36
D2.1	Analogue flow analyses for temperature and precipitation summaries on a seasonal basis	2	R	PU	24
D2.2	Analysis of "never observed before" events	2	R	PU	24
D2.3	Sensitivity of attribution conclusions to model structure	2	R	PU	24

[6] Deliverable numbers in order of delivery dates. Please use the numbering convention <WP number>.<number of deliverable within that WP>. For example, deliverable 4.2 would be the second deliverable from work package 4.

[7] Please indicate the nature of the deliverable using one of the following codes:
R = Report, **P** = Prototype, **D** = Demonstrator, **O** = Other

[8] Please indicate the dissemination level using one of the following codes:
PU = Public.
PP = Restricted to other programme participants (including the Commission/Agency Services).
RE = Restricted to a group specified by the consortium (including the Commission/Agency Services).
CO = Confidential, only for members of the consortium and the Commission/Agency Services.

[9] Measured in months from the project start date (month 1).

D3.1	Description of existing observational datasets and observational needs	3	R	PU	18
D3.2	Description of key sensitive processes leading to extreme events	3	R	PU	24
D3.3	Model evaluation over the ensemble of diagnostics defined	3	R	PU	33
D3.4	Evaluation of the full attribution's system reliability	3	R	PU	33
D4.1	Paper on the attribution of test heatwaves	4	R	PU	36
D4.2	Paper on the attribution of test cold spells	4	R	PU	36
D4.3	Paper on the attribution of test droughts	4	R	PU	36
D4.4	Paper on the attribution of test floods	4	R	PU	36
D4.5	Paper on the attribution of test storm surges	4	R	PU	36
D5.1	A HadGEM3-A based operational attribution system	5	P	PP	24
D5.2	Attribution assessments for the BAMS report	5	R	PU	30
D5.3	Fast-track response assessments based on statistical methodologies	5	R	PU	30
D5.4	Summary report on the new attribution service and future directions	5	R	PU	36

Table 1.3 c: List of milestones

Milestones are control points where decisions are needed with regard to the next stage of the project. For example, a milestone may occur when a major result has been achieved, if its successful attainment is required for the next phase of work. Another example would be a point when the consortium must decide which of several technologies to adopt for further development.

Milestone number	Milestone name	Work package(s) involved	Expected date [10]	Means of verification[11]
M1.1	Suitable description of the envisaged product of event attribution	WP1	8	Description agreed as fit for purpose by stakeholder user panel and EUCLEIA Management Board
M1.2	Harmonised methodology for the focus group organisation and results analysis for the regional level stakeholder needs and understanding analysis	WP1	13	Methodology released.
M1.3	Definition of general public and scientist survey methods	WP1	25	Definition provided to EUCLEIA Stakeholder User Panel
M2.1	Specification of quasi real time analogue analysis programme	WP2	18	Programme specified and found applicable by WP4 partners engaged in case studies
M2.2	Specification of dynamical experimental designs for implementation in WP5	WP2	18	Designs specified and found applicable by WP5 partners
M3.1	Description of the ensemble of diagnostics to be applied for model evaluation	WP3	18	Diagnostics specified and found applicable by WP4 partners engaged in case studies
M3.2	Description of skill measures for the attribution system	WP3	18	Skill measures specified and found applicable by WP4 partners engaged in case studies
M4.1	Validation of the fast-track attribution system	WP4	30	System validated on different types of events

[10] Measured in months from the project start date (month 1).

[11] Show how you will confirm that the milestone has been attained. Refer to indicators if appropriate. For example: a laboratory prototype completed and running flawlessly; software released and validated by a user group; field survey complete and data quality validated.

M4.2	Validation of the HadGEM3-A attribution system	WP4	30	System validated on different types of events
M5.1	Upgrade model resolution and production of the multi-decadal evaluation runs	WP5	24	Software released
M5.2	First ensembles for attribution assessments	WP5	30	Model runs completed
M5.3	Development and testing of methodologies for fast track response	WP5	24	Methodologies applied to case studies and validated
M5.4	Research paper for BAMS with the upgraded system	WP5	30	Research paper accepted for publication by BAMS

Table 1.3 d: Work package description

Work package number	0.1	**Start date or starting event:**	Month 1
Work package title	**Project management**		
Activity Type[12]	MGT		
Participant number			**1**
Participant short name			**Met Office**
Person-months per participant:			**18**

Objectives:

The main aims are:
To run a well managed project, involving stakeholders, and Achieve the maximum benefit to the users, wider community and European Commission through delivery of results and agreed deliverables on time and in full.
Primary objectives within this work package are:

- Provide top level management of the project to ensure aims of the project are efficiently and effectively met, on time and with the resources budgeted;
- Provide effective reporting and communication between the consortium and the European Commission;
- Ensure the appropriate level of consultation with the advisory board of independent experts;
- Coordinate and facilitate effective communication within the project, between partners and stakeholders; including information associated with all project management aspects.

Description of Work and Role of Partners
The management of the *project* is described in detail in Section B.2.1 (Management Structure and Procedures),
but can be summarised in the following activities:

Task 0.1: Manage the project using effective management procedures based on PRINCE2 (Projects IN Controlled Environments) formal methodology. PRINCE2 is de facto standard for project management used extensively by the UK Government and widely used in the UK and internationally. Managing the project includes the following (non exhaustive) activities:
Maintenance of the Consortium Agreement; Overall legal, financial, administrative management and reporting; Handling of legal issues, IPR and other issues under the responsibility of the Special Interests Management Group (dispute/complaints resolution); Handling of project correspondence and day-to-day requests from partners and external bodies; adaptation of project and management structure after changes in the work plan and the consortium; Implementation of competitive calls for the participation of new beneficiaries/partners; Organisation of meetings relating to the management of the project.
Task 0.2: Provide regular and comprehensive communication with the European Commission in Brussels. The conduit for this will be the EUCLEIA Coordinator. This task will ensure the appropriate follow-up of project obligations from the EC contract (scientific, reporting (of science results and finances), project reviews (as agreed under Special Clause 5 of the Grant Agreement), communication, and management. The EUCLEIA Coordinator will ensure that the appropriate EC representative is invited to the Management Board meetings. If there are any major problems within the project that cannot be solved through the appropriate management structure, the Coordinator will liaise with the EC in order to seek advice and a solution.
Task 0.3: Ensure the appropriate level of consultation with the Advisory Board. It is essential that the project receives independent advice and feedback from the Advisory Board, especially in relation to the

[12] Please indicate one activity per work package: RTD = Research and technological development; DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities).

direction of the scientific research and application through to prototype climate services. This task will be undertaken by the EUCLEIA Coordinator (with help from the EUCLEIA Administrator) to ensure that the consultations with the Advisory Board are organised and co-ordinated in an efficient and effective manner, and that advice given is reviewed and acted on as appropriate; Also the appropriate level of project information needs to be provided to the Advisory Board.

Deliverables

D0.1: Internal project Website: This website will be developed and used to facilitate the effective communication between partners within the project. It will be used as the tool for the legal, financial and administrative management of the project [month 3]

Work package number	0.2	**Start date or starting event:**	Month 1
Work package title	**Scientific Coordination of the Project**		
Activity Type[13]	RTD		
Participant number			**1**
Participant short name			**MET OFFICE**
Person-months per participant:			**3**

Objectives:

To establish and maintain the scientific coordination in order to meet the scientific objectives of the project.

Description of Work (possibly broken down into tasks), and role of participants

The tasks below will primarily be the responsibility of the EUCLEIA Science Coordinator who provides the scientific leadership for the project.

Task 0.2.1: Carry out the scientific coordination and monitoring of the research themes, work packages, work package leaders and project progress milestones. This task includes verifying the quality, consistency and timeliness of the work and deliverables. It also includes preparing the scientific element of the reports and deliverables to be submitted to the EC.

Task 0.2.2: Co-ordinate the interdisciplinary activities and cross-cutting activities. This task is necessary in order to make maximum use of the scientific and innovative research within the project, ensure it meets the needs of the identified users and policy makers, and avoids duplication of effort. The Science Coordinator will organise meetings (utilising electronic remote methods wherever possible) with all the work package leaders to facilitate this task.

Task 0.2.3: Management of scientific risk. This will include resolving any conflict relating to technical issues. It will mean acting on unforeseen events and adapting work packages as required.

[13] Please indicate one activity per work package: RTD = Research and technological development; DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities).

Work package number	0.3	**Start date or starting event:**	Month 1
Work package title	**Dissemination and Outreach**		
Activity Type[14]	OTH		
Participant number			**1**
Participant short name			**MET OFFICE**
Person-months per participant:			**3 in-kind**

Objectives:

The Primary objectives are:

- Encourage and facilitate communication, promotion and dissemination of project progress, results and achievements.
- Oversight and management of the stakeholder user panel within the project and ensure optimum exchange of information between stakeholders and project.

Description of Work (possibly broken down into tasks), and role of participants

The activities within this work package will closely interact with the individual dissemination activities of WP1 in the project. Section B.3.2.1 describes the project plans for the dissemination and exploitation of the project results. This Work Package has responsibility for the following tasks :

Task 0.3.1 (Lead Met O): Dissemination plan. This will be developed at the start of the project, including discussions with partners during the kick off meeting. The plan will contain the project specific guidelines that all participants will have to follow when providing information and results from the project. Opportunities will be actively sought out to present the project at external conferences and at IDAG and ACE meetings.
Task 0.3.2 (Lead Met O): Public facing website will be designed, tested and released as soon as possible after the start of the project. This will contain the basic information about the project.
Task 0.3.3 (Lead Met O): Oversee the coordination of the stakeholder participation. Involving the selected stakeholders is key to defining the user requirements for this project and building upon their expertise throughout the project. The Science Coordinator will work with WP1 and other partners to establish the stakeholder user panel very early on in the project and to ensure suitable representation of the stakeholders on the Management Board and at the General Assembly.

Deliverables

D0.3.1) Project Information Pack: A project pack will be put together to provide information about the project to both colleagues and the media so that it can be distributed by project partners. [month 3]
D0.3.2) Updated Dissemination Plan: Update the dissemination plan. The plan will ensure the optimal dissemination and use/exploitation of project results. The description will cover the consortium strategy for dissemination and measures regarding the use of results and the dissemination of foreground during the lifetime of the project and afterwards. [month 3]
D0.3.3) External project website: Development of a public facing project website, and URL released. Project factsheet will be produced and placed on the website. This website will be continually maintained and updated to provide EUCLEIA information to audiences worldwide. [month 3]

[14] Please indicate one activity per work package: RTD = Research and technological development; DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities).

Work package number	1	**Start date or starting event:**		Month 6
Work package title	**"Assessing Detection and Attribution through General Public and Stakeholder Analysis"**			
Activity Type[15]	RTD			
Participant number		**10**	11	9
Participant short name		**HZG**	UVSQ	UOXF
Person-months per participant:		**32**	33	3

Objectives: In this work package we will study in three cases (regional stakeholders, commercial interests, general public vs. scientists applied across two case studies (storm surges in the Baltic and heat waves in the greater Paris area) how different social actors/groups conceptualize what is technically named "detection and attribution" and assess the usefulness of a service, which would provide "event attribution". We will deal both with the general question of how the evidence for the presence and emergence of anthropogenic climate change is perceived, but also specifically with the question how a product, as designed and tested in WP5, will be accepted and understood by different stakeholders. This will entail an analysis of how the general public and key stakeholders frame the benefits of attribution in terms of evidence claim, relevance claim and normative claims. Relevance claims are expressing what matters to society. Analyzing relevance claims will allow the understanding the conditions, in practical terms, under which detection and attribution will matter to society. Evidence claims are expressing causal linkages. Analyzing evidence claims will allow for the identification of potential misunderstanding on attribution and detection and for the identification of the most important deficit currently observable within society. Finally, normative claims are expressing what is good, tolerable, and/or acceptable. Their analysis will allow for an understanding of how progresses in detection and attribution may be attuned to the values of society. This theoretical approach is currently developed and tested by UVSQ within the "Innovative technologies for safer European coasts in a changing climate" (THESEUS) FP7 project.
A first task will be to develop a robust conceptual and theoretical framework rooted in a suitable description of the envisaged product of event attribution. Task 2 will be to run the focus regional focus groups, and it is expected that this part of the work is completed within the first 18 months. Months 19-24 will be used studying the interests and views hold by representatives of the insurance and re-insurance industry; the final year will be used to do the internet-based surveying of the general public and scientists.
One must stress that this Workpackage focuses on two particular "terrains" – storm surges and heat waves -, yet EUCLEIA goes beyond these two terrains. Nevertheless, in order to develop a coherent conceptual and methodological framework, these two terrains contain the needed diversity (culturally, in terms of the nature of "risk", and in terms of the nature of dominant stakeholders). In order to dwell on, and benefit to, EUCLEIA diversity, each deliverable will explicitly refer to transferability of the theoretical framework, the methodological approach and the results.
The results of the various Tasks will lead to propositions on the following key element: how to close the expected gap between stakeholder expectations and scientific innovative, curiosity-driven research. One of the key innovative elements that will give an added robustness and clarity to the results lies in the systematic identification of what, within views and perceptions, belongs to gaps in terms of needs (differences in relevance claims), to gaps in terms of knowledge (differences in evidence claims) and to gaps in terms of associated values (differences in normative claims).

Description of work

Task 1.1 : Social articulation of attribution: defining the conceptual and theoretical foundations (lead UVSQ)
This first work-task will develop the conceptual foundations of the WP. This will entail the definition, with WP5, of what is a suitable description of the envisaged product of event attribution. Using this description various existing theoretical framework (risk perception theory, cultural risk cognition, social constructs, integrated risk governance, soft system analysis) will be assessed in terms of their potential to theorize the social articulation of attribution. These theoretical frameworks will be assessed against their potential to allow for an understanding of the attribution products' consistency with stakeholder (including public) needs without compromising scientific

[15] Please indicate one activity per work package: RTD = Research and technological development; DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities).

rigor.

Task 1.2 : Attribution: regional level stakeholders' needs and understanding (lead HZG)

The first two empirical test cases deal with regional publics and regional stakeholders, namely

a) In the greater Paris area, dealing with the climatic extreme of **heat waves** and the their challenges for **public health**, and
b) Along the German Baltic Sea coast, dealing with the threat of **storm surges** and their challenges for public safety and coastal erosion. This work will be related to ongoing cooperation within the BALTEX network of regional climate scientists.

This work task will consist on stakeholder identification according to an attribution-relevant typology that is coherent with the theoretical framework developed in Task 1.1. Both partners, HZG and UVSQ have developed good working relationships with regional and municipal authorities and other stakeholders on the two issues of Baltic Sea Coast management and environmental health in the greater Paris area.

Three focus groups in each test case will be run. The results will be analyzed and compared. The analytical framework, although organized around evidence claim, relevance claim and normative claims, will stem for its finer dimensions from the theoretical frame developed in Task 1.1.

A wider **internet-based survey** will be conducted as well (a first collection of stakeholders has been established and the methodology was already tested in the framework of the German Project RADOST, see Bray, D. and G. Martinez, 2011: A survey of the perceptions of regional political decision makers concerning climate change and adaptation in the German Baltic Sea region. *International BALTEX Secretariat, ISSN 1681-6471 Publication No. 50*)

Task 1.3 : Attribution: its interest for the insurance and re-insurance sectors as a proxy to commercial interests and other stakeholder groups (lead HZG, Paartners UOXF).

There is already a documented interest in the insurance industry to learn about evidence of ongoing climate change, and about new products, which may come out of "event attribution". Both partners in WP1, as well as the coordinator of the overall project have contacts to such companies and their associations.

Months 19-24 will be used studying the interests and views hold by representatives of the insurance and re-insurance industry. Throughout the project there will be on-going engagement with a targeted group of stakeholders via the stakeholder user panel.

Task 1.4 : Attribution: indentifying the gap between the general public and the scientific community and dissemination to (lead UVSQ, Partners UOXF)

The **general public** will be polled using a commercial surveying company (in Germany: FORSA), who will run about telephone interviews among a representative segments (about 1000 samples) of the two regional publics. Similar polling has been done on a similar issue for the perception of climatic threats in Hamburg since 2008 (cf. Ratter, B.M.W., K. H.I. Philipp and H. von Storch, 2012: Between hype and decline – recent trends in public perception of climate change. *Environmental Science & Policy* 18: 3 – 8)

An internet-based approach for surveying scientists and/or stakeholders is available at the IfK in Geesthacht and at the UVSQ. The IfK approach has been used to investigate views of regional scientists about issues related to climate and climate change (Bray, D., 2010: A survey of the perspectives of climate scientists concerning climate change and climate science in the Baltic Sea basin. *International BALTEX Secretariat ISSN 1681-6471, Publication No. 48*) in the framework of he GEWEX-Project BALTEX.

The UVSQ approach has been used to survey Scientists and Stakeholders within the "Improving Knowledge and Communication for Decision Making on Air Pollution and Health in Europe (APHEKOM EU funded) project and within the "a Transdisciplinary approach to the Emerging Challenges of Novel technologies: Lifeworld and Imaginaries in Foresight and Ethics" (TECHNOLIFE) FP7 project.

There will be development of online resources to support key concepts and ideas crucial to understanding attribution science and the project website will be developed to include information on how attribution results can be used in the decision-making process.

Deliverables (brief description and month of delivery)

Deliverable 1.1 (Month 12): Theoretical Working Paper on the conceptual foundations of exploring the social articulation of attribution.

Deliverable 1.2 (Month 20): Empirical Working Paper analyzing regional stakeholders' needs and understanding in terms of attribution for two cases: storm surges on the Baltic and heat waves in the greater Paris area. Includes

transferability consideration for other situations.
Deliverable 1.3 (Month 24): Empirical Working Paper on commercial dimension of attribution product using the insurance and re-insurance sectors as proxy.
Deliverable 1.4 (Month 35): Empirical Working Paper on perceiving attribution: gaps between the general public and scientists.
Deliverable 1.6 (Month 36): Synthesis report "Promoting attribution products: condition for success with stakeholder and recommendations."

Milestones

Milestone 1.1 (month 8): Suitable description of the envisaged product of event attribution

Milestone 1.2 (month 13): Harmonized methodology for the focus group organization and result analysis for the regional level stakeholders' needs and understanding analysis.

Milestone 1.3 (month 25) : Definition of general public and scientist survey methods based on the results of Tasks 2 and 3

Work package number	2	**Start date or starting event:**				Month 1
Work package title	**Development of attribution methodologies and exploration of framing issues**					
Activity Type[16]	RTD					
Participant number		**10**	3	1	7	8
Participant short name		**UOXF**	CNRS-LSCE	MET OFFICE	KNMI	Uni Reading
Person-months per participant:		**39**	18	6	15	15

Objectives:

This WP will develop methodologies for dynamical modelling and develop statistical methodologies and will explore the impact of different ways of framing the attribution problem on conclusions regarding different classes of weather events, to identify events for which these framing issues are particularly important. This will require "ensembles of ensembles" exploring multiple ways of defining present-day and natural climate and exploring their implications for attribution. These issues will be explored using a combination of low-cost statistical methods, and a relatively computationally efficient model (HadAM3P with the nested HadRM3 regional climate model, or RCM), and, if available on home computers, the HadGEM3-A model which forms the core of the qausi-operational attribution system being developed in WP5. Multi-thousand-member dynamical model ensembles will be generated by members of the European public at very low cost. Our aim will be to identify one or two representative experimental designs, with a clear understanding of their properties, to implement in the core attribution system. The WP will also consider how to relate statistical and dynamical model based approaches, the latter of which provide a more direct approach to attribution but which may be subject to dynamical model error.

The work package will consist of the following elements.

- Exploration of framing issues using both dynamical models and statistical models
- Development of methodologies for dynamical modelling including bias adjustments
- Development of statistical methodologies including flow analogues and development of a basket of statistical indices.
- Explore sensitivity to ensemble size by making parallel multi-thousand member ensembles
- Explore sensitivity to spatial resolution by making parallel high resolution ensembles using both the nested regional model design and global model experiments
- Explore sensitivity to the representation of ocean-atmosphere interactions by making parallel experiments in which a prescribed SST boundary condition is compared with an ocean mixed layer boundary condition.

Description of work (possibly broken down into tasks), and role of participants

Task 2.1 Develop framing of issues
Month 1-36; Lead (Oxford 15pm), Partners Met Office (6PM)
This task will test different methods of designing attribution studies and framing attribution questions generating very large climate model ensembles using the "weatherathome" distributed computing project. This will allow us to explore different experimental designs, permit a comprehensive analysis of the impact of ensemble size on the robustness of attribution conclusions, and also provide inputs to WP1 for assessing how attribution conclusions are understood. Different experimental designs will be explored under the EUCLEIA project, spanning a spectrum in the extent to which different factors are held constant in the attribution problem. Results from these different designs will be presented to stakeholders under WP1 to assess which design best matches their expectations and interpretation of attribution studies. The designs include experiments in which ensembles of atmosphere models driven with observed sea surface temperatures and sea ice (SSTSI) are compared with ensembles driven with SSTSI and atmospheric composition modified to simulate "natural" conditions without anthropogenic influence, where these natural SSTSI conditions are estimated from coupled models from the CMIP-5 ensemble in conjunction with standard detection and attribution methods to estimate the pattern and amplitude of anthropogenic warming, with associated uncertainties. This will be compared with an alternative design in which reanalysis boundary conditions drive an RCM and are compared with boundary conditions modified to remove anthropogenic signal in temperature and humidity but otherwise held constant, and a further design in which observed SSTSI

[16] Please indicate one activity per work package: RTD = Research and technological development; DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities).

fields are replaced with an ensemble of 6-month-lead forecast SSTSI fields generated by the EuroSIP multi-model seasonal forecasting project, hence redefining "present day climate" as not what actually happened, but the component that could have been predicted several months in advance. To ensure a fair comparison of approaches, EuroSIP SSTSI fields will be bias-corrected using the EuroSIP hindcast ensemble.

Task 2.2 Sensitivity of attribution conclusions to model structure
Month 1-36 Lead Oxford (24pm), Partners Reading (15PM), KNMI (9pm)
The objective of this task is to investigate the sensitivity of attribution conclusions to aspects of model structure, specifically: the choice of atmosphere model (comparing HadAM3P, HAdGEM3A and EC-EARTH); the spatial resolution of the atmosphere model; and the representation of ocean-atmosphere interactions. The core experiments in Task 2.1 and WP5 rely on a prescribed SSTSI boundary condition, but two-way ocean-atmosphere interactions are an important influence on the development, persistence and decay of the atmospheric circulation anomalies that play a key role in high impact events. This task will therefore investigate the importance of these interactions for attribution.
The research will focus on analysis of a set of case studies (informed by WP4). Ensemble simulations of the chosen case studies will be carried out using the different global model systems. Sensitivity to ocean-atmosphere interactions will be investigated by comparing HadGEM3A simulations that use a prescribed SSTSI boundary condition with simulations in which the same model is coupled to a high resolution version of the KPP mixed layer scheme, using a combination of "Q-flux" and relaxation boundary conditions to ensure that low-frequency (multi-annual) SSTSI variations match those observed, but allowing the model to simulate short-term variations stochastically. [Additional experiments may be carried out using HadAM3P couple to a similar or simpler ocean mixed layer.] Sensitivity to atmosphere model resolution will be investigated by comparing simulations with EC-EARTH at several different resolutions between T159 and T799. A wide range of process-based diagnostics (WP3) will be used to identify the reasons for differences between results from the different experimental designs.
Task 2.3 Statistical methodologies for comparing current climate with past climate events
Month 1-36; Lead CNRS-LSCE (18pm), Partners: KNMI (6 pm)
This task will produce statistical diagnostics aiming at comparing events on seasonal and subseasonal timescales (precipitation, temperature) with those in previous decades, allowing detection of changes. First, weather events will be compared with those expected during circulation analogues (Yiou et al., 2007; Vautard and Yiou, 2009) of past decades. This will allow to first attribute events to specific atmospheric circulations. This "analogue" method designed in previous studies will be further extended to all types of extreme events concerned by the EUCLEIA project and the operational system, and to subseasonal phenomena such as shorter cold spells or heat waves. Simple products such as histograms of best analogue years, movies of analogue composite variables will be published in weekly increments. The "quality" of circulation analogues will be estimated, in order to define a measure of the exceptional character of the atmospheric circulation and detect possible unprecedented flows. When only poor analogues are found or temperature/precipitation past analogue composites do not encompass the current observation, an analysis of the event will be performed in order to try identifying possible causes in unusual forcing (regional SST, snow cover, soil moisture). Seasonal updates of the comparison of return times of events that occurred for temperature and precipitation at various time scales (daily, monthly and seasonal) with those in groups of previous decades (1950 – 1980) and (1980 – 2010) will be designed, using extreme value theory under hypothesis of stationarity. These developments will consider single time series but also other characteristics of extreme events such as the duration of events and spatial extent. CNRS-LSCE will also investigate the possibility of extending return time estimation in a non-stationary context. Other statistical indices qualifying the magnitude of the events (amplitude, duration, seasonal statistics of dry days, heavy rainfalls, drought (and heatwave), will be designed, based on results of WP1, compared across multidecadal time series and updated on a seasonal time scale.

Deliverables
D3.1[month 24] Analogue flow analyses for temperature and precipitation summaries on a seasonal basis.
D3.2 [month 24] Analysis of "never observed before" events.
D3.3 [month 24] Sensitivity of attribution conclusions to model structure
Milestones
M3.1 [month 18] Specification of quasi real time analogue analysis programme.
M3.2 [month 18] Specification of dynamical experimental designs for implementation in WP5

Work package number	3	**Start date or starting event:**				Month 1	
Work package title	**Evaluation and diagnostics**						
Activity Type[17]	RTD						
Participant number	**3**	1	2	4	5	6	7	8
Participant short name	**CNRS-LSCE**	MET OFFICE	ETH	UEDIN	IC3	DMI	KNMI	Uni Reading
Person-months per participant:	**24**	10	21	10	12	12	6	11

Objectives: "Trust building" is an essential component of the development of an attribution of climate events service. This must rely both on a demand-driven component (covered by WP1) and on an objective analysis of the ability of models to simulate the development of high-impact events and underlying processes (this WP) (Nature Editorial, 2012). WP3 will (i) collect related existing observations and identify observational gaps [Task 3.1], (ii) identify key processes that drive the development of extreme events using sensitivity experiments and analyses of observations [Task 3.2], (iii) define quantitative diagnostics (indices, energy budgets, synoptic situations...) in order to better characterize and explain events development and to evaluate attribution models used in the prototype service (WP5) against observations [Task 3.3], (iv) define quantitative measures of reliability of the overall attribution system and to define methodologies and rules to produce reliability assessments [Task 3.4]. WP3 will provide a selection of observations, numerical experiments, indices and reliability measures to WP4 and WP5, with distinction between fast-track and slow-track availability, together with an array of diagnostics to be applied to the cases under study.

Description of work, and role of participants

Task 3.1 Observations for key climate processes : collection and identification of needs

Month 1 – 18; Lead ETH (5PM); Partners CNRS-LSCE (6PM)

The task will identify existing in situ and remote sensing observations relevant to each type of extreme event (drought, flood, heat wave, cold spell, storm surge) considered and collect them for model evaluation, such as the ESA CCI soil moisture dataset (http://www.esa-soilmoisture-cci.org) or GEOLAND data sets. In addition, ground observations will be used, including soil moisture, runoff, surface fluxes and classical meteorological datasets. Modern reanalysis products will also be considered. The task will then identify observational gaps for event attribution, observation needs for verification and bias correction of attribution models, methodological developments that make synergetic use of in situ and space-borne observations, as well as requirements for observation network density, dataset length, and homogeneity [ETH, LSCE].

Task 3.2 Identification of key processes driving extreme events

Month 1 – 24; Lead ETH (9PM); Partners LSCE (4PM), DMI (6 PM), Uni Reading (6PM), Uni Edinburgh (4 PM)

The task will aim at identifying a set of key climate processes leading to high-amplitude events. This will help (i) providing a mechanistic understanding the development of events, (ii) disentangling the contribution of single factors (e.g. large-scale circulation anomalies vs initial soil moisture conditions) to the respective events, and (iii) evaluating attribution models used in WP4 and WP5. It will be based on a thorough literature review for each event type considered, based in particular on the IPCC Special Report on Extreme Events (Seneviratne et al., 2012) and other recent publications having in particular highlighted the respective roles of large-scale drivers vs. regional feedbacks for extremes (Mueller and Seneviratne, 2012; Quesada et al., 2012; Hoerling et al., 2012; Kenyon and Hegerl, 2008 & 2010). Identification of key processes will also be done using statistical analysis (see also Task 3.3), including based on the observations compiled under Task 3.1 and dedicated long-term model sensitivity experiments, in contrast with experiments made in WP4 dedicated to end-to-end case studies. The conducted sensitivity experiments will focus on (i) the role of the North Atlantic and Arctic ocean-atmosphere interactions on sub-seasonal, seasonal and decadal time scales on European weather anomalies using a GCM (HadGEM3) with coupled or uncoupled ocean [U. Reading], (ii) the contribution of regional and sub-regional distributions of soil moisture and snow cover vs. large-scale forcing using long-term sensitivity simulations with regional climate models (COSMO-CLM^2 [ETH], WRF [CNRS-LSCE]), (iii) the impact of changes in aerosol burden on European

[17] Please indicate one activity per work package: RTD = Research and technological development; DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities).

anomalies and the ocean state [Uni Reading], as well as (iv) the role of recent changes in Arctic sea ice extent with GCM (EC-Earth) simulations [DMI]. Furthermore, model-data comparisons will identify mechanisms involved in a extremes in models and observations including those compiled under Task 3.1 (composite analysis over a number of events of lower amplitude than cases of WP4, quantile regression analyses) [Uni Edinburgh, ETH]. These analyses will lead to the definition of relevant key processes and variables to be evaluated in attribution models under Task 3.3.

Task 3.3: Development of diagnostics and model evaluation

Month 1 – 33; Lead: LSCE (14PM); Partners: ETH (7PM), Uni-Edinburgh (6PM), DMI (6PM), KNMI (6PM), Uni Reading (5PM)

Given the processes and observations identified in Task 3.1 and 3.2, Task 3.3 will develop an ensemble of quantitative diagnostics that will help in assessing the skill of the operational attribution models used under WP4 and WP5 for the respective considered events. Diagnostics will include indices of standardized precipitation index, soil moisture indices [ETH], indices of the evapotranspiration regime (Teuling et al., 2009; Seneviratne et al., 2010) [ETH, CNRS-LSCE], snow cover [CNRS-LSCE], regional SST [Uni Reading], arctic sea-ice extent [DMI], stratospheric vortex [DMI], circulation regimes [CNRS-LSCE, Uni Edinburgh], aerosols [Uni Reading], land surface water and energy budgets [ETH, CNRS-LSCE] and moist static energy (Shongwe et al., 2009) [KNMI]. These quantitative indices, applied to observations or reanalyses, will then be used as metrics for the evaluation of long simulations of the operational models used in WP4 and WP5 [all]. For instance, the skill of attribution models involved in WP5 in simulating the circulation states (spatial extent, amplitude, frequency, duration; Hamilton et al., 2012) involved in possibly less extreme precipitation cases than WP4 will be evaluated [Uni Edinburgh]; the ability of models to correctly simulate soil moisture and surface energy and water fluxes in drought/heat wave will also be measured using the observations identified in Task 3.1 and the relationships derived under Task 3.2 [ETH]. Bias correction methods, using observations and long-term simulations will be proposed to WP4 and WP5 and their impact will also be assessed. In addition, an evaluation of the confidence (using e.g. IPCC calibrated language) in the operational models as attribution tools for specific extremes will be provided as input to Task 3.4 [ETH, Uni Edinburgh].

Task 3.4: Development of reliability assessments methods

Month 1 – 33 ; Lead MET OFFICE (10PM); Partners IC3 (12PM)

This task will develop and apply and extend measures developed in seasonal forecasting for assessing the overall reliability of the attribution [Christidis et al., 2012c] and convert such measures into calibrated statements about the trustworthiness of attribution results. Examples of reliability measure are the reliability diagram used in ensemble prediction, or the rank histogram [MET OFFICE, IC3]. The measures will be applied to the verification runs of the prototype attribution system based on ensembles generated with the HadGEM3-A [MET OFFICE] [Task 5.1]. Consideration will be given to appropriate calibration of model output, an important methodological challenge when considering attribution statements from different sources (Christidis et al., 2012c; Palmer et al., 2008; Stephenson et al., 2005). This task will therefore develop a protocol for model calibration and model verification to be applied to the operational system tested in WP4 and run routinely in WP5 [MET OFFICE]. This task will also develop rules to produce confidence levels for assessments, which would be based on calibrated language (for example using the IPCC uncertainty language), whereby results of Task 3.3 will also be taken into account in confidence assessments. The key aspect here would be to communicate the extent to which a user should place trust in results from attribution products. Therefore this aspect will be informed by engagement with stakeholder groups, via WP1.

Deliverables (brief description and month of delivery)

D3.1 [Month 18] : Description of existing observational data sets and observational needs

D3.2 [Month 24] : Description of key sensitive processes leading to extreme events

D3.3 [Month 33] : Model evaluation over the ensemble of diagnostics defined

D3.4 [Month 33] : Evaluation of the full attribution system's reliability

Milestones

M3.1 [Month 18] : Description of the ensemble of diagnostics to be applied for model evaluation

M3.2 [Month 18] : Description of attribution system skill measures

Work package number		4	**Start date or starting event:**				Month 18		
Work package title		**Applications of the methods to targeted test cases**							
Activity Type[18]		RTD							
Participant number	**7**	1	2	3	5	6	8	10	11
Participant short name	**KNMI**	MET OFFICE	ETHZ	CNRS-LSCE	IC3	DMI	Uni Reading	UOXF	HZG
Person-months per participant:	**12**	3	11	4	4	6	3	12	12

Objectives: This work package will apply methods developed in WP1, WP2 and WP3 and carry out a set of targeted in-depth analyses on chosen test cases as demonstration and proof of concept of the prototype attribution services. The results feed back into the design of the systems in WP5. For each class of extreme climate events two examples are chosen from the recent past. If events occur during the project these are given precedence over older events. As in the real application of event attribution, for each event one partner will be responsible for collecting the analyses from all other partners on the basis of the work in WP2 and WP3 and writing a scientific article. We will also provide the information on the basis of WP1. The classes, partners responsible and preliminary events are 1) Heat waves: University of Oxford: Russian heat wave 2010, Southern Europe 2005 (west) or 2006 (east); 2) Cold spells: DMI: February 2012 cold spell, December 2010 snow and cold; 3) Floods: KNMI: Britain summer 2012, Rhine winter 1996; 4) Droughts: ETHZ: Central Europe summer of 2003, Mediterranean summer of 2012,; 5) Storm surges: HZG: Baltic 1 November 2006, one other event to be decided.

For these events, we will estimate the change in the risk due to anthropogenic factors. Attribution will be performed with the full range of methods developed: a comprehensive description using the observations and diagnostics developed in WP3; a fast-track response that would be available within a week based on near-real-time (NRT) observations (WP3), analogues and statistical measures such as return times and their evolution (WP2), pre-computed model analyses (WP2), reliability indicators (WP3) that would be available within a week; and a more thorough analysis with the validated observations (WP3), the SST-driven runs (WP2) and dedicated sensitivity experiments (WP4) to test the 6-9 month response time after an event occurred.

Description of work, and role of participants

Task 4.1: Application of exhaustive event diagnostics to these events

This task will determine the meteorological and climate processes that generate the extreme events under study (either historical or during the project), using the process diagnostics developed and evaluated in WP3. We will gather remotely sensed observations, in situ meteorological observations, analyses and modern 4DVAR reanalyses that would be available in NRT (within a few days) and half a year later. These will be complemented by evaluations of the land surface water and energy budgets, and moist static energy budgets (including the surface radiations balances) of the region affected during the course of the events, circulation regimes evolution and comparison with historical analogues. The task will also include regional/global model sensitivity experiments as designed in WP3 but targeted to the test cases (e.g. sensitivity to convection parameterization, soil moisture, model resolution, SST, snow cover, sea-ice, etc…) to assess sensitive processes and the skill in simulating the particular case-study event. These case-study based numerical experiments will build upon the methods developed in WP3 based on long-term numerical experiments and observations. The work will be carried out by the same participants that develop the diagnostics in WP3 but in the context of a series of scientific papers written in collaboration with the other partners. (5 pm per event type, 25 pm total, months 18-28)

Task 4.2 Application of the fast-track methods

For each event a statistical analysis is performed with the data that would have been available shortly after the event, as would be the case in fast-track attribution. The input data consist of the following components:

1. NRT satellite and in-situ observations of the event, meteorological analyses and reanalyses,
2. historical homogenous satellite and in-situ datasets and reanalyses,

[18] Please indicate one activity per work package: RTD = Research and technological development; DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities).

3. pre-industrial and present-day control GCM simulations at the required resolution,
4. analogues of past circulation anomalies to measure the contribution of circulation anomaly.

The fast-track method consists of (1) establishing the meteorological characteristics of the event in observations, (2) application of the statistical analyses developed in Task 2.3 on historical observations and reanalyses, (3) a statistical analysis established in Task 2.3 of appropriate dynamical model output that has been pre-processed in WP2, and (4) a study based on past analogues as defined in Task 2.3. For each event an attribution statement is prepared in collaboration with all partners using the collaboration tools being developed in Task 5.2. This can be a first estimate of the Fraction of Attributable Risk accompanied by an estimate of the uncertainty, but also a statement that based on the data available at this time scale no attribution is possible. The conclusions should then be compared to the full diagnostic information developed in Task 4.3. Problems in using the methods should feed into Task 5.2. (2pm per event type, 10 pm total, months 23-30).

Task 4.3 Application of targeted methods.

For each event in the catalogue, the model output of Task 2.2, the reliability indicators of Task 3.3 and sensitivity experiments are used to simulate a model-based attribution study as could be performed using the information available at a time frame of 6-9 months. In this time frame the datasets available include:

1. validated satellite and in-situ observations of the event,
2. output from climate models at the resolution required to attribute the extreme event under consideration, forced by observed or model-generated SST data,
3. reliability assessments of the model for these kind of events,
4. targeted experiments that investigate the role of external factors on the event under study, as well as seasonal predictions.

For this task the data from (2) will be delivered by WP 2.1 and (3,4) will be taken from the experiments already performed in WP3 if these are available, otherwise the sensitivity experiments will be performed in this task. On the basis of these data a thorough attribution will be undertaken. This should start with a comparison of the diagnostics developed in Task 4.2 to both the model and observations or reanalysis data to validate whether the model correctly simulates the relevant processes. For instance, for heat waves this task will consider the role of land use changes and soil moisture feedbacks in addition to other anthropogenic and natural drivers on the occurrence of targeted heat wave and drought events in Europe, including targeted experiments to elucidate the role of different forcings. For the storm surges the global model output will be downscaled with 1.6km resolution 3D ocean model. On the basis of the assessment of which models represent the physical processes correctly the simulations of these models are used to compute the FAR and an uncertainty band based on natural variability and model uncertainty as estimated from the model spread. This information will be presented in the scientific articles that also include the physical description. If the event occurs within the second-last year of the project it will be included in the annual BAMS attribution report. Additionally, the system developed in Task 5.1 will be tested as if the event occurred during this time period (or alternatively, if the event occurred during the project it would be used). (5 pm per event type, 25 in total, months 25-36).

Deliverables (brief description and month of delivery)

4.1 [Month 36] A paper on attribution of the test heat waves (month 36, U. Oxford)
4.2 [Month 36] A paper on attribution of the test cold spells (month 36, DMI)
4.3 [Month 36] A paper on attribution of the test droughts (month 36, ETHZ)
4.4 [Month 36] A paper on attribution of the test floods (month 36, KNMI)
4.5 [month 36] A paper on attribution of the test storm surges (month 36, HZG)

Milestones

4.1) [Month 30] Validation of the system set up by Task 5.3 for fast-track event validation.
4.2) [Month 30] Validation of the system set up by Task 5.1 for routine event attribution.

Work package number	5	**Start date or starting event:**		Month 6
Work package title	**Development and application of a near-real time attribution service**			
Activity Type[19]	RTD			
Participant number	**1**	3	5	7
Participant short name	**Met Office**	CNRS-LSCE	IC3	KNMI
Person-months per participant:	**36**	3	9	6

Objectives: In the aftermath of devastating extreme weather and climate events there is high demand for information on how anthropogenic causes might have influenced the occurrence of such events. Effective adaptation planning could help minimise the socio-economic impact of extremes and is often facilitated by robust and reliable attribution assessments. The information is required by users on a variety of time scales: a fast-track response on the media time scale of a week, a more robust targeted response at the end of each season and an annual assessment of last year's extremes delivered by research papers. WP5 aims to develop a service that delivers high-quality attribution assessments in a timely manner. WP5 will be informed by the user perspective investigated by WP1, will use tools developed in WP2, will apply evaluation methodologies from WP3 to quantify the reliability of the results and will apply lessons learned from the case studies in WP4. The main products and output of this work package include:

- Attribution assessments at the end of each season
- Assessments of main extreme events of the past year delivered to BAMS
- Fast-track assessments of extremes to the extent possible
- Report on lessons learned and future improvements of the service

Description of work, and role of participants

Task 5.1 Development of a quasi-operational HadGEM3-A attribution system

Months 1:24 Lead: MET OFFICE (24pm), Partners: IC3 (9pm)

This task will develop a prototype attribution system based on ensembles generated with the HadGEM3-A model (Christidis et al., 2012c) and will incorporate it into a near-real time framework that will provide attribution assessments on a seasonal timescale. The model output will be downscaled, if necessary, for the study of events developing on local scales that the model cannot resolve.

This task includes the following components:

a) Upgrading the model to higher horizontal and vertical resolution (Months 1-12). The model resolution will increase from N96L38 (current configuration) to N216L85 consistent with the seasonal forecasting model. The upgrade will resolve smaller spatial scales (~60km instead of ~135km at mid-latitudes) and will have a better representation of the stratosphere. The upgrade will also benefit from a new hydrology scheme and updated estimates of the historical anthropogenic and natural forcings.

b) Evaluation runs (Months 13-24). Once the system is upgraded, a small ensemble of 5-10 multi-decadal simulations (1950-present day) with all the main historical forcings will be produced for the purpose of model evaluation. The output will be used to construct reliability diagrams and rank histograms developed in WP3 to assess how reliably the model can attribute different types of extremes in different regions. The ability of the model to provide a realistic statistical representation of extreme events will also be assessed.

c) Ensembles generation (On a seasonal basis from month 24 onwards). Ensembles of 100 simulations will be produced for the actual climate and a hypothetical climate without human influences. The former will employ SST and sea-ice boundary conditions from HadISST observations. The latter will use estimates of the anthropogenic change in the SSTs from coupled models that will be subtracted from the observations to provide the boundary conditions in simulations without human influences. An adjustment will also be made to the sea-ice based on empirical relationships derived from observations. The simulations will be 6 months long, spanning not only the most recent season, but also the one before.

[19] Please indicate one activity per work package: RTD = Research and technological development; DEM = Demonstration; MGT = Management of the consortium; OTHER = Other specific activities, if applicable (including any activities to prepare for the dissemination and/or exploitation of project results, and coordination activities).

Task 5.2 Delivery of seasonal and annual assessments of extreme events for the BAMS report

Months 24-36 Lead MET OFFICE (11 PM)

This task will provide attribution assessments of key events from the previous year based on the attribution system developed in Task 5.1 to BAMS. Seasonal delivery of assessments based on the upgraded HadGEM3-A system will begin in year 3, once the system has been set up and evaluated and the necessary simulations have been produced. Attribution of extremes from seasonal timescales to specific events. A comprehensive analysis will include both a model evaluation assessment and an estimate of the change in likelihood of the events due to human influences.

Task 5.3 Delivery of fast response assessments

Months 24-36 Lead KNMI (6 PM), CNRS (3pm)

This task will provide fast-track response assessments of the human influence on climate extremes on the media time scale of about one week. It will deliver estimates of the Fraction of Attributable Risk (FAR), which measures how anthropogenic forcings change the likelihood of exceeding (or going below) the observed extreme. This task will employ a range of statistical methods, including time series analyses (van Oldenborgh, 2007; van Oldenborgh et al 2012), optimal fingerprinting (Christidis et al., 2012a; Christidis et al., 2012b) and other tools developed in WP2 and WP3 that can be applied to the time scales required. A semi-operational analysis chain will be set up that will produce a first estimate of the FAR within about a week.

Task 5.3 consists of the following steps, each of which requires some infrastructure to be built and tested:

a) Collection of near-real-time observational data on events using the in-situ, satellite and (re)analysis products explored in WP3. Required: a system that automatically collects necessary information within days after the event.

b) Statistical analysis of the observations using the methods developed in Task 2.3 and validated in Task 3.2. Required: a system that analyses the observations of step 1 using these methods.

c) Attribution assessments of seasonal temperature extremes will be prepared on the basis of pre-computed FAR tables from optimal fingerprinting analyses with CMIP5 models. Required: pre-computed tables produced during months 1-12, evaluation of the models from WP3.

d) Discussion of the results among the participating institutes and partners world-wide. Required: discussion software, network of partners willing and able to contribute at these time scales.

Final results will be disseminated to the user groups of WP2. The test events of WP4 serve to test the system.

Task 5.4 Summary report and future directions

Months 31-36 Lead MET OFFICE (1pm) with input from other partners

This task will produce a report on the main results and the steps needed for the next upgrade of the attribution service, including identification of the gaps in additional modelling and observational capability required.

Deliverables (brief description and month of delivery)

D5.1 [Month 24] A HadGEM3-A based operational attribution system that runs on a seasonal cycle. This will deliver attribution assessments for each season together with estimates of the associated uncertainty.

D5.2 [Month 30] Attribution assessments of main events of the past year for the BAMS annual report.

D5.3 [Month 30] Fast-track response assessments based on statistical methodologies.

D5.4 [Month 36] Summary report on the current attribution service and future directions.

Milestones

M5.1 Model upgrade to N216L85 with updated forcings (to be completed by month 12) and production of 5-10 multi-decadal evaluation runs with natural and human influences (months 12-24)

M5.2 First ensembles for attribution assessments (months 24-36 and on a quarterly basis thereafter)

M5.3 Development and testing of statistical methodologies for fast-track response (months 12-24) and dissemination of output information among users (months 24-36).

M5.4 First research paper for the annual BAMS report with the upgraded higher resolution HadGEM3-A system (months 13-24 and 25-36). Complementary contribution from IC3.

Table 1.3 e: Summary of staff effort

A summary of the staff effort is useful for the evaluators. Please indicate in the table the number of person months over the whole duration of the planned work, for each work package, for each participant. Identify the work-package leader for each WP by showing the relevant person-month figure in bold.

Participant no./short name	WP0.1	WP0.2	WP0.3	WP1	WP2	WP3	WP4	WP5	Total person months
MET OFFICE	**18**	**3**	**3** in Kind		6	10	3	36	76 +3
ETH Zurich						21	11		32
CNRS					18	24	4	3	49
UEDIN						10			10
IC3						12	4	9	25
DMI						12	6		18
KNMI					15	6	12	6	39
UNI READING					15	11	3		29
UOXF				3	39		12		54
HZG				32			12		44
UVSQ				33					33
Total	18	3	3	65	93	106	67	54	409

2. Implementation

2.1 Management structure and procedures

EUCLEIA brings together a number of European partners, and will have strong interactions with stakeholders in order to develop and deliver user-driven attribution products. It is therefore essential the project has an effective management structure and decision-making procedures, as described below. The aims of the management structure and procedures are to ensure that as well as managing the project on a day to day basis, individual strands
of the project are fully integrated so that full benefit can be realised from the output of each work package.
To achieve this, a management theme (WP0.1 – WP0.3) has been included in the project. The primary purpose of this management theme is to ensure activities carried out throughout the project are fully integrated towards a common purpose; and the project is able to deliver the benefits in full to the stakeholders, users and wider community. The management theme will provide top level management of the project, ensuring research is carried out in an effective and efficient manner and progress is reported to the European Commission on a regular basis. The management theme has has three work packages; WP0.1 (Management of EUCLEIA), WP0.2 (Scientific Coordination of EUCLEIA) and WP0.3 (Dissemination and Outreach).

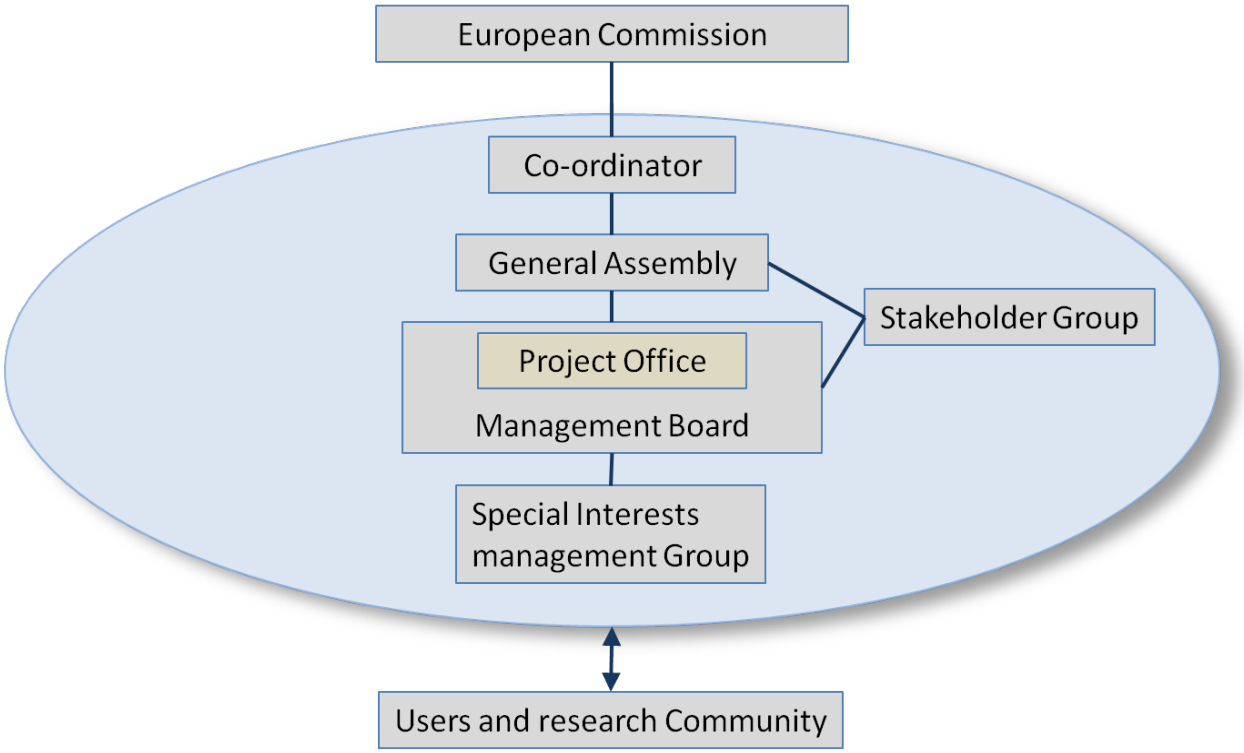


Figure 2.1.1 EUCLEIA management Structure

The management structure is designed to manage the interactions and information exchange between partners, project administration, the European Commission and stakeholders in as rapid and efficient a manner as possible. The structure has been kept as simple as possible to optimise important interactions between all parties.
The project will be coordinated by Dr Peter Stott, from the Met Office, who has considerable experience in the international attribution community and in leading large projects. All project administration and management of financial reporting and contractual matters will be handled by a team at the Met Office, supported by experienced legal, finance and communication teams, with extensive experience of European Framework Programmes.
Details of the components of the management structure, identified in Figure 2.1, are given below, together with the specific roles and responsibilities of individuals associated with each group. In summary:

- The General Assembly of all partners is the primary decision-making body for the project;
- The Management Board will be the supervisory body ensuring a successful execution of the project;
- The day-to-day management of the project will be conducted by the project office;
- The Special Interest Management Group (SIMG) will be convened to provide specialist advice to the Management Board on issues such as IPR, ethics and gender balance;
- The Stakeholder User Panel will influence and advise on project activities from a stakeholder/user perspective;
- The Advisory Board will provide independent advice on the project's progress and plans from the perspective of external experts.

2.1.1 EUCLEIA Management Structure

2.1.1.1 General Assembly

The General Assembly consists of one member of each of the partner institutions. Its purpose will be to:

- act as the final decision-making body for the project;
- discuss progress of the project and plans; and
- advise the management board on matters relating to the work plan.

Meetings will be held at least once a year, including one at the start of the project and a final meeting at the end of the project.

Any member of the General Assembly may, provided it has written support of 50% or more of the consortium members, request that the EUCLEIA coordinator convene a General Assembly. This must then be convened at the earliest practicable opportunity. Decisions made by the General Assembly will be acted on by the project office or the Management Board as appropriate, where the decision has been supported by at least two thirds of the partners.

Members can attend the meeting and vote in person, appoint a proxy to vote on their behalf or register their vote in writing prior to the meeting if they cannot attend.

2.1.1.2 Management Board

Overall management and oversight of the project will be carried out by the Management Board, who will be responsible for:

- acting on the decisions of the General Assembly;
- ensuring work packages are fully integrated;
- sharing knowledge as widely as possible across and beyond the project;
- agreeing the work plan;
- recommending resolutions for any disputes between partners;
- ensuring the proper operation of the consortium, including financial management, reporting, communication,
- delivering the aims, deliverables and milestones of the project.

In the event of changes to the consortium composition or budget allocation changes, the Management Board will make recommendations for the General Assembly to approve.

The Stakeholder User Panel (discussed below) will be represented on the Management Board and at the General Assembly by the Science Coordinator (discussed below). The Special Interests Management Group (discussed below) will be formed as required by the Management Board and will be represented on the Management Board by the Project Manager.

Management of Risk

The Management Board will be responsible for risks, issues and benefits realisation of the project. Day-to-day maintenance of the registers will be undertaken by the project office.

Membership of the Management Board

The management board will consist of:

- EUCLEIA coordinator (chair of the board);
- Project manager (reports to the board);
- Science coordinator;
- All work package leaders;
- EUCLEIA administrator (secretary for the board);

For quorum at Management Board meetings, all of the following must be present, although they may appoint a deputy if they are unable to attend:

- EUCLEIA coordinator or a representative from the project office (to chair the meeting);
- A WP leader or representative from each WP.

The Management Board will meet at project inception and thereafter at each of the general assemblies. Additional meetings can be called at any time as required by any member of the management board. However, these can be conducted via video-conferencing/Skype/Webex if appropriate. Voting on any matters will be based on a simple majority of the management board. If no majority is reached; then the coordinator, or delegated chair, will have the casting vote.

2.1.1.3 EUCLEIA Coordinator and Project Office:

EUCLEIA will be co-ordinated in all the administrative, financial and management aspects by the Met Office Management tasks include:

- Administrative and financial management: Responsibility for distributing finances and payments to all project parties; monitoring and controlling the budget; and providing necessary financial reports to the EC;
- Providing clarification on any budget and financial issues arising;
- Scheduling, organising and chairing the standard consortium meetings; such as inception and final meetings;
- the General Assembly meetings (in collaboration with appropriate partners); the Management Board meetings, and Special Interests Management Group meetings;
- Providing support and planning tools for work package management. This includes resource management, reporting mechanisms, and checklists for actions and decisions;
- Managing, monitoring and reporting on progress of the project against the agreed deliverables and milestones.
- Any significant modifications of the work plan (as agreed by the Management Board) also need to be managed;
- Ensuring that the project risks, issues and benefits are recorded and well managed;
- Managing the Special Interests Management Group. This group will be comprised of various partner members;
- Providing the necessary coordination with other EU-funded, and international, projects.

Membership and Responsibilities of the Project Office

EUCLEIA Coordinator (Dr Peter Stott)

Responsible for the overall coordination of the project; coordination with other EU funded and international projects; chair of the management board; communicating with the EC on agreements and deviations from agreed plans; acting as the project point of contact for the EC; point of contact for the advisory board. Reports to the European Commission and is assisted by the project manager and science coordinator.

Science Coordinator (Dr Nikolaos Christidis)

Responsible for monitoring scientific progress of the research themes and work packages; provides science leadership for the project; coordinating the scientific work of the research themes and work packages; leading the case studies coordination; member of EUCLEIA management board; chair of the stakeholder group. Reports to the EUCLEIA coordinator and is assisted by the work package leaders.

Project Manager

Responsible for facilitating internal communication within the project; scheduling meetings of the project; providing regular communications to the EC and the EUCLEIA Coordinator; managing, monitoring and reporting of project finances and budget; leading the Special Interests Management Group and represents the group on the Management Board; management of the risks, benefits and issues registers. Reports to the Management Board and is assisted by the EUCLEIA administrator.

EUCLEIA Administrator

Responsible for assisting with the communication between the different groups; organising meetings of the project; assisting with management, monitoring and reporting of project finances/budget; assisting with maintenance of the risks, benefits and issues register; providing secretarial support to the EUCLEIA coordinator, project manager and science coordinator. Reports to the project manager. specialist support (e.g. finance, legal and communications) will be provided to the project office by the appropriate Met Office departments; and other partners institutes when necessary.

2.1.1.4 Special Interests Management Group

The Special Interests Management Group (SIMG) will be formed as required to provide specialist advice on the management of aspects of Intellectual Property Rights (IPR), ethics and gender, complaints and dispute resolution. The project manager will co-ordinate these activities and report to the general assembly and management board on behalf of the SIMG. The ultimate responsibility for the management of these matters will remain with the management board and the general assembly, depending on whether the matter relates to the work plan or to issues affecting partners respectively.

IPR, Ethics and Gender Aspects Management

IPR issues will impact all partners and the IP management will be a regular task for the SIMG. IP management is detailed under Part B.3.2. Ethics issues are detailed in Part B.4 and Gender aspects in Part B.5 of this Document.

Dispute resolution

In the event of a dispute between partners, the SIMG will form a temporary panel to identify a resolution to the dispute. The resolution will be passed back to the management board or general assembly as appropriate via the project manager for action to be taken.

Complaints Management

In the event that any complaints are received about the project, a panel from within the SIMG will be formed to manage the complaint through to a successful resolution. The resolution will be passed back to the management board or general assembly as appropriate via the project manager for action to be taken.

2.1.1.5 Stakeholder Group

A stakeholder is an invited individual or organisation who has a specific interest in the activities and outputs of the project, such as the tools and techniques that are being proposed. Stakeholders bring high levels of sector- and subject-specific knowledge that will be used to help develop the project's deliverables, including the case studies and the climate service prototypes. They will be able to participate in the work packages and provide support and advice throughout the project. The stakeholder group is already well advanced (a subset of those identified have provided letters of support – see Appendix 4) and will be formally formed just after the project start (WP 11). There will be two stakeholder conferences, one near start of the project and one at the end. Other stakeholder meetings will be arranged with appropriate partners as required.

The stakeholder group will be chaired by the science coordinator, who will also represent them on the Management Board and at the General Assembly.

2.1.1.6 Advisory Board

This small independent group will be created by the EUCLEIA Coordinator, and will be made up of distinguished experts in the area of climate science and climate servivces. The advisory board members will provide independent advice and recommendations about improvements to the project's work plans, tools and techniques. Consulting with the advisory board will ensure that the deliverables, milestones and associated products and prototypes of EUCLEIA, support the overall aims of EUCLEIA and parallel European and international policies (such as the WMO GFCS). The advisory board will receive information detailing the project status and results. The advisory board is currently composed of:

- Dr. Claudia Tebaldi (Head of IDAG, Climate central)
- Prof Francis Zwiers (Director, Pacific Climate Impacts Consortium)
- Dr Thomas Peterson (Chief scientist NCDC, Chief editor of BAMS attribution issue)
- Prof David Karoly (University of Melbourne, Australia)

The final composition of the board will be decided early in the project, allowing important input from stakeholder groups to be fully considered. They could meet by phone or face to face at project meetings.

2.1.2 Dissemination and Communication Strategy

It will be important to communicate effectively both internally within the project, and externally beyond the project. Communication within EUCLEIA have the potential to be complicated by the disparate and dislocated nature of the partners. Every effort will be made to minimise the requirement for face to face meetings, by use of email, the internet, teleconferencing, video conferencing, Skype and other forms of remote communication that may be available. To ensure that partners are kept informed with the way the project is progressing, an internal website will be set up. All project reports and documents will be available through this website. Communications beyond the EUCLEIA partners and stakeholders will be coordinated by the project office (WP 0). The dissemination of project results is described in detail in Part B.3.2, and a Dissemination Plan will be developed at the start of the project.

2.2 Individual participants

Partner 1 – Met Office (short name: Met Office)

Brief description of the organisation:

The Met Office is the UK's National Weather Service. It includes the Met Office Hadley Centre (MOHC) with 180 employees who specialise in climate research and prediction to inform decision-making. The Met Office employs a total of 510 Scientists. The Met Office is a Trading Fund within the UK Government's Department for Business, Innovation and Skills. This status engenders a business approach in addition to our R&D activities resulting in successful products and service delivery.

The Met Office has developed and delivered climate services within the UK and internationally for many years. Users are from a variety of sectors including water, energy, health, transport, agriculture and tourism. These services inform decision-making for adaptation and mitigation to climate variability and climate change. The development of the Met Office's Climate Service is a key strategic aim to satisfy customer requirements. Over the last few years the Met Office has been at the forefront of research into climate variability and predictability; development of operational ensemble-prediction systems, derived applications and products for seasonal to decadal timescale.

The Met Office is highly active in numerous international climate service-related activities, including

- WMO's GPCs for long-range forecasts. Outputs from these will be part of climate services in Europe;
- WMO's key strategic activity to develop the Global Framework for Climate Services (GFCS): Involvement in writing the Implementation Plan being written for approval by WMO Extraordinary Congress;
- Climate Services Partnership (CSP): Co-organised the First International Conference on Climate Services in October 2011. This led to the creation of the CSP, where the Met Office has a seat on the Core Group;
- FP6 ENSEMBLES project: Co-ordinated by the Met Office. The footing for climate services in Europe;
- FP7 EUPORISA project. Co-ordinated by the Met Office. Developing end-to-end climate impact prediction services.
- Other EU FP projects, e.g.: EUCLIPSE - Climate cloud processes; ERA-CLIM - Global climate re-analyses; ICE 2 SEA - Sea and sea-ice processes for climate; and COMBINE - Improvements in climate modelling.

Tasks assigned/Role in the project:

The Met Office will coordinate and manage EUCLEIA and lead WP 1, WP3 and WP4; WP 42 and co-lead WP 23. The Met Office will contribute to all other WPs. Its research activities will include the assessment of user needs and vulnerabilities, assessment of dynamical downscaling, climate information indices, development of complex impact models, quantifying and communicating uncertainty in impact models and developing a framework for dealing with uncertainty, the use of climate information in decision-making, developing climate service prototypes and delivery tools, engage with stakeholders, and assess climate services as a business opportunity.

Short profile of key personnel involved:

Dr Peter Stott: Scientific Strategic Head for the Climate Monitoring and Attribution area of the Met Office Hadley Centre. He leads the development of the scientific research aiming to provide better observational evidence base for responding to climate variability and change and to improve understanding of the causes of observed changes. Apart from scientific publications in leading journals, Peter has been heavily involved in the production of IPCC reports, as lead author in the 4th Assessment Report and co-ordinating lead author in the 5th Assessment Report. He also has considerable experience in communicating scientific findings about climate to the public and has given many media interviews, including on TV, radio and to many print journalists.

Dr Nikolaos Christidis: Senior Climate Change Attribution Scientist. He has extensive experience of developing and applying detection and attribution methodologies to identify possible causes for changes in climate extremes. He has led research that provides real-time attribution information for regional temperature extremes and developed a prototype system for an attribution service that will deliver regular assessments of the human contribution to recent extreme events. This information is essential to inform decision making and adaptation planning.

Dr Richard Jones: Scientific manager responsible for the development of the new Met Office Hadley Centre regional climate modelling, HadGEM3-RA and its application in the WCRP Coordinated Regional Downscaling Experiment CORDEX. Lead author of the Regional Context chapter of IPCC Working Group 2 Fifth Assessment Report and Met Office focal point for the UNFCCC Nairobi Work Programme providing advice on climate projections, scenario development and application and downscaling relevant to climate change adaptation.

Partner 2 – Eidgenoessische Technische Hochschule Zurich (short name: ETH Zurich)

Brief description of the organisation:
The Swiss Federal Institute of Technology (**ETH Zurich**) was founded in 1855 and is the leading Swiss university in the areas of natural sciences and engineering, with about 17,000 students and 10,000 staff. Currently it is ranked among the 15 best universities in the world and 5 best universities in Europe according to the QS World University ranking. The **Institute of Atmospheric and Climate Science** at ETH Zurich has long and wide-ranging expertise in climate research, atmospheric physics and chemistry, and hydrology. The institute has a staff of about 130 researchers, technicians and Ph.D. students. The **Chair of Land-Climate Interactions** investigates the role of land surface processes in the climate system using global and regional climate models, land surface models, diagnostic estimates, ground and satellite observations, and field measurements. Climate model evaluation and process-based analyses with respect to land surface processes and land-climate interactions, including their contribution to drought and heatwave dynamics, belongs to the core expertise of the research group. The research group is highly active in numerous national and international climate research projects, including:
- ESA CCI soil moisture project (Leader of climate research component): Evaluation of new WACMOS / ESA CCI soil moisture product, assessment of historical soil moisture trends, model evaluation
- EU-FP7 EMBRACE project (WP leader, Land processes): Process-based evaluation and bias reduction of current Earth System Models with respect to land surface processes and land-climate interactions
- EU-FP7 DROUGHT-RSPI project: Past and projected drought trends, evaluation of drought representation in current climate models, subseasonal and seasonal drought forecasting
- EU-FP7 Carbo-extreme project (executive board member): Impacts of extreme events on terrestrial carbon cycle
- NRP61 DROUGHT-CH (SNF; Lead PI): Early warning of drought in Switzerland and Central Europe

Tasks assigned/Role in the project:
ETH Zurich is involved in WP3 and WP4. In WP3, it will lead Tasks 3,1 and 3.2. Task 3.1 coordinates the compilation of observational datasets, including space-based observations, for the evaluation and validation of the models used in the project, while Task 3.2 coordinates sensitivity experiments for the mechanistic assessment of the processes contributing to the occurrence of the investigated extreme events. In WP4, it will lead the case-studies based assessment of drought attribution, and use an extension of the WP3-based sensitivity experiments for the mechanistic investigations of the case study events.

Short profile of key personnel involved:
Sonia Seneviratne, Assistant professor and chair of the land-climate interactions research group, is an expert in land-atmosphere interactions, hydrometeorology, and land surface and climate modeling. She has published over 60 scientific articles in this research area, and is active in several national and international research projects. She was coordinating lead author of the physical chapter of the Intergovernmental Panel on Climate Change (IPCC) special report (2009–2012) on "Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX)". Furthermore, she is a Scientific Steering Committee member of the Integrated Land Ecosystem-Atmosphere Processes Study (iLEAPS), a member of the World Climate Research Program's Global Energy and Water Cycle Experiment (GEWEX) Data and Assessment Panel and Global Land/Atmosphere System Study (GLASS).
Edouard Davin has expertise in land surface modeling and regional climate modeling, as well as in the assessment of impacts of land use/land cover changes for regional and global climate. He has led the development of the COSMO-CLM^2 regional climate model, which is used by a broad community.
Lukas Gudmundsson is a specialist in large-scale hydrology, focusing on the impact of climatic drivers on continental scale hydrological dynamics. He has expertise in modern statistical techniques, bias correction methods and approaches for diagnostic land-surface model validation.
Martin Hirschi has expertise in the compilation and assessment of observation-based datasets. in statistical data analysis and statistical downscaling, and in the assessment of soil moisture-temperature feedbacks and climate change impacts.
Boris Orlowsky has expertise in climate data analysis, ranging from station data to global climate model output. His most recent focus is the quantification of trends and uncertainty in multi-GCM CMIP5 projections with respect to droughts and other extreme events. He was a contributing author to the recent IPCC SREX report.

Partner 3 - Labratoire des Sciences du climat et de l'environnement (short name: CNRS -LSCE)

Brief description of the legal entity: CNRS (National Center for Scientific Research) is a government-funded research organization, under the administrative authority of France's Ministry of Research. As the largest fundamental research organization in Europe, CNRS carried out research in all fields of knowledge. The CNRS/LSCE laboratory will be involved in EUCLEIA. It is a joint research unit from *Centre National de la Recherche Scientifique* (CNRS), the *Commissariat à l'Energie Atomique* (CEA) and the University of Versailles – Saint Quentin en Yvelines, which employs currently 160 permanent staff in the fields of climate analysis, modelling and observation. LSCE is in particular active in the statistical analysis of climate time series and extreme weather. It has participated and led a number of national, European and international projects.

Main tasks attributed: CNRS-LSCE will lead WP3 on diagnostics and evaluation and specifically the task on evaluation of the processes in the attribution models. It will also provide heat wave and cold spell indices and circulation regimes in this WP. CNRS-LSCE will also largely contribute to WP2 by developing an ensemble of statistical indices and a methodology using circulation analogues in order to better compare extreme events with past events and detect changes. It will provide these tools to WP4 and WP5.

Previous experience relevant to the tasks: CNRS-LSCE has extensive experience in climate research. Over the past years it was involved in several international projects concerning climate analysis including eg IMPACT2C, CMIP5, PMIP, CORDEX, and the climate KiC. Development of statistical methods including analogue methods, extreme value, spectral methods and downscaling methods and associated theory has been a major research topic of LSCE for years. Tens of peer-reviewed articles have been published in this area. Recently a diagnostic activity has taken place where regional modelling is also used for assessing drivers of temperature extremes.

Short profile of staff members undertaking the work:

Robert Vautard has 25 years research experience in atmospheric and climate science: climate analysis, regional climate modelling including atmospheric chemistry. He has experience in climate studies, through weather regime and climate extreme time series analysis, as well as several modelling studies using the WRF and IPSL-CM models. He has published around 120 peer-reviewed articles and has an experience in management; he was head of LSCE between 2006 and 2010. He is deputy director of the Paris Climate Consortium (http://www.gisclimat.fr), whose objective is to foster interdisciplinary research on climate change impacts, and is chairing the research programme of the L-IPSL excellence laboratory of Institut Pierre-Simon Laplace, which helped initiating projects on climate extremes. He is a WP leader in two FP7 projects (IMPACT2C, ATOPICA).

Pascal Yiou is an experienced researcher, with expertise including time series analysis and extreme value theory for climate. He has coordinated an FP6 project (Extreme Events: Causes and Consequences), several French ANR projects, and has participated to three FP and many ANR projects on climate variability. Collaboration with **Julien Cattiaux** following his PhD work on the evolution of temperature extremes and detection of changes using advanced statistical methods will be continued.

Chantal Pacteau joined CNRS in 1983 as a researcher. An agronomist, she has also a PhD in cognitive science. As the Ex-deputy director of CNRS international relations directorate, she has also expertise in the science and society dialogue. She is currently deputy director for interdisciplinary of the Paris Climate Consortium (http://www.gisclimat.fr). She is leading the French team of the project " *New Territories: Urban Rooftops in Regard to Energy and Life Styles… Learning from Chicago, Montreal, Paris* " launched by the Atelier international du Grand Paris (http://www.ateliergrandparis.com/news/?p=1894).

Partner 4 – University of Edinburgh (short name: UEDIN)

Brief description of the legal entity:

The University of Edinburgh is one of the largest and most successful universities in the UK with an international reputation as a centre of academic excellence. The University is the leading research university in Scotland and is amongst the top ten in the United Kingdom. Almost all members of staff at the university are research active. Following the results of the 2008 Research Assessment Exercise some 63% of the University's research activity is in the highest categories (4* and 3*), of which one third is recognised as "world-leading". The results place the University in the top 5 in the UK and number one in Scotland by volume of 4* "world-leading" research. Traditionally the University has been very successful in participating in European Framework Programmes. Currently in the Seventh Framework Programme the university participates in some 187 projects with an award value of €116M. Further, the University takes a lead role in several large scale Collaborative Projects. It is the University's stated aim that it wishes as far as possible to conduct its research and development activities on a trans-national basis.

Previous experience relevant to the tasks:

The College of Science & Engineering is in the front rank of UK University science and engineering groupings for research quality and research income. In the most recent (2008) UK Research Assessment Exercise the College of Science & Engineering continues to be a top performer, 96% of the research was classified as world-leading in terms of originality, significance and rigour. 42% of the world-leading scientists and engineers in Scotland are at the University of Edinburgh, and all seven of the Schools within the College are in the top 6 in the UK in their disciplines. The College is also a key player in European research collaborations, participating in 125 projects in Framework 6 and to date 128 projects in Framework 7. The College also currently has 14 ERC awards.

Short profile of staff members undertaking the work:

Simon Tett is Chair of Earth System Dynamics and Modelling at the University of Edinburgh where he also, in 1992, received his PhD. He previously worked at the Hadley Centre as a research scientist and showed that human emissions of carbon dioxide were likely to be responsible for 20th century warming. After this he managed a team of scientists who created datasets of historical climate change from the atmosphere, sea and land surface and the sub-surface ocean with uncertainty estimates. He has carried out and analysed simulations of the climate of the last 500 years. He has contributed to observing system studies and published more than 50 peer-reviewed papers, won the Norber-Gerbier WMO prize twice (1997, 1998), a NOAA prize for best scientific paper (1998), the L G Groves prize for Meteorology (2006) and gave the Margary lecture to the Royal Meteorological Society in 2007. He contributed to the last three IPCC assessments, is a review editor on the 5th assessment report and provided scientific advice to the UK government. He is a PI on NCAS and NCEO funded projects as well as a RAPID-WATCH project. Tett will lead the Edinburgh bid

Gabriele Hegerl is Chair of Climate System Science. Hegerl published the first paper showing that the anthropogenic influence on surface temperature changes is detectable and can be separated from natural influences, and contributed to the first paper showing that global precipitation patterns have changed due to human influences. Her research also demonstrated that daily extreme temperature and precipitation precipitation extremes show detectable changes. Hegerl has published more than 90 papers in the peer reviewed literature and was a Coordinating Lead Author) of the IPCC 4th Assess. Report, Working Group I, and a drafting author of the Summary for Policymakers. She is a Lead Author for the 5th Assessment report and a member of the synthesis report writing team. Hegerl serves on a variety of committees including the MOHC science review group, and is presently PI on three NERC grants, co-I on an NCAS grant, as well as on a RAPID NERC grant (both PI'ed by Simon Tett) and another NERC grant (PI Sandy Tudhope). She has recently been notified that her bid for an ERC advanced fellowship has been recommended for funding. **Hegerl and Tett's joint research group** supports a vibrant research group that presently comprises 3 graduate students and 4 PDRAs, many of them co-supervised; and an NCAS PDRA (to be appointed). Hegerl will lead the temperature extremes component.

Partner 5 – Fundacio Institut Catala De Ciencies Del Clima (short name: IC3)

Brief description of the organisation:

The Institut Català de Ciències del Clima (Catalan Institute of Climate Sciences, IC3, Spain) is funded by the Catalan government and aims at developing high-quality research on climate variability and prediction, and its impacts. The Climate Forecasting Unit (CFU, http://ic3cfu.wikispot.org), the research unit involved in this project strong of 15 scientists and technicians, undertakes research on the development of dynamical and statistical methods for the prediction of global and regional climate on time scales ranging from a few weeks to several years. The formulation of the predictions includes the development and implementation of techniques to statistically downscale, calibrate and combine dynamical ensemble and empirical forecasts to satisfy specific user needs in the framework of the development of a climate service. Making progress in dynamical global climate modelling with a focus on monthly-to-decadal climate prediction is one of the main objectives of the CFU, for which it uses the EC-Earth and develops initialization methods that allow improving different aspects of the forecast quality. The assessment of the sources of predictability and the limitations of current climate prediction systems to exploit them, especially over Europe, Africa and South America, inspires many of the publications of the unit. The CFU is currently involved in five FP7 projects, QWeCI, DENFREE, CLIMRUN, SPECS and EUPORIAS, and several nationally- and privately-funded projects.

Tasks assigned/Role in the project:

IC3 will contribute to WPs 3, 4 and 5. Its research activities will include contributing to apply and extend measures developed in seasonal forecasting for assessing the reliability of attribution statements in Task 3.3, to the development of the model-based attribution that could be performed using the information available at a time frame of 6-9 months on the basis of the reliability information in Task 4.3, and to develop a prototype near-real time attribution system for seasonal time scales based on ensembles generated with the HadGEM3-A in Task 5.1. These contributions will aim at developing a climate service prototype that enhances business opportunities.

Short profile of key personnel involved:

Prof. Francisco J. Doblas-Reyes is a worldwide expert in the development of seasonal-to-decadal climate prediction systems and the head of the CFU. He is involved in the development of the EC-Earth ESM since its inception. He is an IPCC lead author (Fifth Assessment Report), serves in several WCRP and WWRP scientific panels, has participated in a number of FP4 to FP7 projects, is coordinator of the FP7 collaborative project SPECS and is author of more than 60 peer-reviewed papers. He is shaping IC3's plans for the development of European climate services.
Dr. Isabel Andreu-Burillo is a senior scientist with more than 15 years of experience in operational and research oceanography, including the development of data assimilation codes, in institutions of France, United Kingdom and Australia.

Publications:

Guémas, V., F.J. Doblas-Reyes, F. Lienert, Y. Soufflet and H. Du (2012). Identifying the causes of the poor decadal climate prediction skill over the North Pacific. J. Geophys. Res., 117, D20111, doi:10.1029/2012JD018004.
van den Hurk, B., F.J. Doblas-Reyes, G. Balsamo, R. Koster, S. Seneviratne and H. Camargo Jr. (2012). Soil moisture effects on seasonal temperature and precipitation forecast scores in Europe. Climate Dyn., 38, 349-362, doi:10.1007/s00382-010-0956-2.
Du, H., F.J. Doblas-Reyes, J. García-Serrano, V. Guemas, Y. Soufflet and B. Wouters (2012). Sensitivity of decadal predictions to the initial atmospheric and oceanic perturbations. Climate Dyn., 39, 2013-2023, doi:10.1007/s00382-011-1285-9.

Partner 6 – Danmarks Meteorologiske Institut (Short name: DMI)

Brief description of the organisation:

DMI is the national meteorological service for Denmark, Greenland and the Faeroe Islands. Through scientific research and development, DMI secures the optimum accomplishment of its tasks and serves the community with up-to-date information on weather and climate and other geophysical issues. Research areas include climate science, oceanography, development of the DMI-HIRLAM numerical weather forecasting system, and middle atmosphere physics. The Danish Climate Centre at DMI has extensive experience in research on climate variability and on regional and global climate modelling. The modelling experience includes studies of climatic sensitivity to external forcing, natural climate variability, seasonal and decadal prediction as well as model development. The Danish Climate Centre has taken part in numerous EU supported projects on global and regional climate modelling and science of the middle atmosphere, recently including ENSEMBLES, PRUDENCE, SCOUT-O3, COMBINE etc.

Tasks assigned/Role in the project:

DMI will mainly contribute to work-packages 2, 3, and 4. In WP2 DMI will develop and apply an ensemble surrogate technique to attribute extreme events to either natural variability or climate change. In WP3 DMI will identify key mechanisms and processes of extreme events related mainly to winter cold spells (arctic sea ice, Northern Annular Mode). In WP4 DMI will lead the in-depth analysis on cold spells.

Short profile of key personnel involved:

Bo Christiansen, Senior Scientist, has addressed a number of topics focused on atmospheric dynamics circulation regimes, climate sensitivity, the coupling between the troposphere, climate sensitivity and paleo-reconstructions. The overarching issue has been statistical methods. He has made extensive use of climate models but he has also experience with simpler models such as 1-dim radiative-convective models. He has co-ordinated two international research projects, CliChem and ROCS, financed by the European Commission. In the period 2001-2005 he was a member of the board for the Climate Programme (KlimaProg) under the Norwegian Research Council. He has authored or co-authored more than 50 refereed papers.

Peter Thejll, Senior Scientist. Extensive experience in statistical analysis of climate data. Has worked on Climate change attribution studies in the context of the Sun-Climate proposal. Modelling experience from the Quantify project where a model for airplane contrail advection was investigated. Extensive experience with ENSEMBLES data in terms of emergence of climate change signals in temperature and precipitation over Europe. Also investigating into drought indices and their evolution in historic data and based on the ENSEMBLES scenario data. Radiance modelling of Earth scenes based on DWD CMSAF project Earth Observation data.

Shuting Yang: Senior Scientist. Extensive experience in areas of climate modelling, climate variability and climate change. Work covers topics including atmospheric circulation regimes, climate sensitivity and feedbacks, and climate prediction and projections, by using both idealized, simplified circulation model and Earth System models. In charge of global climate model development at the Danish Climate Centre and involvement in the development of the European Earth System model, EC-Earth, and its CMIP5 simulations. Panel Member for Natural and Engineering sciences under the Swedish Research Council, 2012.

Partner 7 – Koninklijk Nederlands Meteorologisch Instituut (short name: KNMI)

Brief description of the organisation:
The KNMI (Royal Netherlands Meteorological Institute) is the Dutch national weather service and centre for climate research. Climate research at KNMI is aimed at observing, understanding and predicting changes in the climate system. KNMI produces climate scenarios for use by stakeholders for developing adaptation and mitigation strategies and climate reports describing and attributing regional climate change in the Netherlands. It has a strong climate research component grouped around a global climate model (EC-EARTH), a regional climate model (RACMO), satellite (eg OMI and TROPOMI) and in-situ observations (ECA&D database) and climate analysis (Climate Explorer). The latter two activities are part of the Regional Climate Centre (RCC) for WMO Region VI. KNMI is dedicated to using world-class research to make climate information and knowledge to its end users. This is shown by

- responsibility for regional climate data archives (ECA&D, SACA&D),
- co-ordination of the development of the European climate model EC-EARTH,
- co-ordination of EU projects (EUCLIPSE, EURO4M),
- participation in EU-projects (ENSEMBLES, THOR, COMBINE, EMBRACE, SPECS),
- participation in event attribution initiatives, such as the article "Explaining Extreme Events of 2011 from a Climate Perspective" (BAMS, 2012),

In the research plans for 2012-2015, event attribution is a research priority for KNMI.

Tasks assigned/Role in the project:
KNMI will perform SST-forced runs with the EC-EARTH global model for the period 1962-2012, investigate selected events at a higher resolution (WP2), and develop an energy budget method (WP3) to investigate the source of heat and moisture of extreme events. KNMI will lead the work package dedicated to the application of the methods on selected test cases (WP4), investigating floods itself and co-ordinating the investigations into heat waves, cold spells, droughts and storm surges by the partner institutes. KNMI will set up a fast-track attribution system that pulls together all observations and models that are available within a few days in order to be able to make a preliminary attribution statement on the media time scale of one week (WP5).

Short profile of key personnel involved:
Dr. **Geert Jan van Oldenborgh** is senior researcher in the Global Climate Research division of KNMI. He is a climate analyst with a strong background in statistical analysis of observations, seasonal and decadal forecast verification, and climate event attribution. As the author of the KNMI Climate Explorer he makes large amounts of climate observations, analyses and model output available for analysis to the wider climate-interested community. He is Lead Author for the IPCC WG1 AR5 (Chapter 11, Near-term projections and predictability, and Annex I Atlas).
Prof. **Wilco Hazeleger** is head of the Global Climate Division of the KNMI. He is a climate scientist with a wide experience in coupled atmosphere-ocean modeling. His research has been directed at interannual to decadal variability in the ocean-atmosphere system, weather extremes in a changing climate and the transfer of knowledge from the climate community to the users of the information. Currently he coordinates the EC-EARTH project.
Dr. **Albert Klein Tank** has been working as a scientist at KNMI for more than 20 years now. He is actively involved in observational research embedded in international projects and programmes. Albert co-ordinates the European project EURO4M which develops regional reanalyses of past weather and user-oriented data products for monitoring climate variability and change in Europe (see www.euro4m.eu). He leads the European Climate Assessment & Dataset project that joins over 40 meteorological services in Europe and the Mediterranean. ECA&D delivers high quality observational datasets and information services on changes in weather and climate extremes (see eca.knmi.nl). Albert is also involved in the production of the 2007 and 2013 assessment reports of the IPCC. Currently, he co-chairs a global expert team on the topic of detection and attribution of anthropogenic climate change. On a national level, he co-ordinates the climate change scenarios for the Netherlands constructed by KNMI for local adaptation. Albert has published papers in scientific journals, as well as policy relevant reports (see www.knmi.nl/~kleintan).

Partner 8 – University of Reading (short name: Reading Uni)

Brief description of the organisation:
The Department of Meteorology at the University of Reading is the largest in Europe with over 20 teaching staff, 80 research staff and around 50 PhD students. It has received the highest research rating of 5* in all UK Research Assessment Exercises, indicating an international reputation in all aspects of research. It is a member of Reading's Walker Institute for Climate System Research, established to promote integrative research across the University. The Department hosts the Climate Directorate of the UK's National Centre for Atmospheric Science (**NCAS-Climate**). The NCAS-Climate group at Reading provides a strategic programme in modelling and understanding the climate. It currently consists of over 40 scientists, more than half of whom are on grants from NERC, EU and other organisations. NCAS-Climate has strong links with the UK Met Office and works closely with them on many aspects of climate model development and evaluation, and applications to understanding climate variability and change, and predictability and prediction.

NCAS-Climate has played major roles in numerous European and national projects that are directly related to EUCLEIA, including:

- Leading EU PREDICATE which pioneered European research in decadal climate variability and predictability.
- EU THOR investigating the role of the Atlantic Meridional Circulation in European Climate variability and change.
- EU SPECS which is addressing the development of seasonal forecasts and related climate services for Europe.
- NERC TEMPEST and NERC TEA-COSI consortium projects which are investigating the impact of climate change on European climate.

Tasks assigned/Role in the project:
The University of Reading will contribute to WP2, WP3 and WP4. Its research activities will include performing experiments with uncoupled atmosphere and coupled atmosphere-ocean mixed-layer climate models to assess the sensitivity of attribution results to air-sea interaction (WP2); performing sensitivity experiments and developing diagnostic indices to determine the role of sea surface temperatures, sea ice and aerosol in the development of extreme events (WP3); and assessing the role of sea surface temperatures and sea ice in the development of the specific extreme events being studied in WP4. NCAS-Climate has extensive experience in performing such climate model experiments and developing our understanding of the role of air-sea interaction and regional drivers in climate variability and change, gained - for example - through the projects identified above.

Short profile of key personnel involved:
Dr. Len Shaffrey is a Senior Scientist in NCAS-Climate based at the University of Reading. Dr. Shaffrey is the Senior Atmospheric Scientist for the NERC High Resolution Modelling Programme and led the development of the HiGEM high-resolution coupled climate model. He is also leading a project to jointly deliver, with the UK Met Office, decadal climate predictions using HiGEM. Dr. Shaffrey is the Lead Principal Investigator for the TEMPEST consortium project, which is investigating how extratropical cyclones will respond to climate change, and a Principal Investigator for the NERC TEA-COSI consortium project which is researching the impact of a seasonally sea ice free Arctic on the wider climate system.
Prof. Rowan Sutton is the Director of Climate Research for NCAS. He is a Lead Author (chapter 11) for the IPCC fifth Assessment Report. Previously he was a Royal Society University Research Fellow and NERC's Climate System Theme Leader. Professor Sutton leads a research group on seasonal-to-decadal climate variability, predictability and prediction. Professor Sutton has led pioneering research in the field of decadal climate prediction. He was coordinator the EU PREDCIATE project and is currently a Principal Investigator in the related EU THOR and SPECS projects. He is also Principal Investigator of the NERC VALOR consortium, which is researching the value for climate predictions of the RAPID array observations of the Atlantic Meridional Overturning Circulation.

Partner 9 – University of Oxford (short name: UOXF)

Brief description of the organisation:
The University of Oxford is consistently ranked amongst the top-ten research universities in the world. With substantial recent and ongoing investment in physical climate science research, faculty and infrastructure (such as supercomputing), the University now employs ~120 staff directly working within climate science research groups, utilizing a substantial stream of research funding from the UK's NERC, the European Research Council and FP7 collaborative programmes. The University has existing formal links to the European Center for Medium Range Weather Forecasting, and NERC's National Centre for Atmospheric Science, alongside many strong collaborative links with the UK Met Office, which have recently been strengthened by the University's inclusion in the Met Office's Academic Partnership scheme. The Oxford e-Research Centre (OeRC) hosts the climateprediction.net weatherathome distributed computing project, which provides a key resource to this consortium.

Tasks assigned/role in the project: The primary role of UOXF is to test various approaches to attribution under WP2 and contribute to test implementation in WP4. Simulations driven with reanalyses will be undertaken in-house using the Oxford Supercomputer, while remaining tasks will use distributed computing, which allows large ensembles to be undertaken at low cost and minimum environmental impact, requiring 9pm in OeRC for coordination. Attribution experiments with reanalyses and using prescribed observed and natural SST forcing will be set up and analysed by a PDRA in SoGE under Prof. Allen (24pm, 12 in WP2 and 12 in WP4), while exploring the impact of SSTs from a multi-model ensemble of seasonal forecasts (EUROSIP) will be performed by a PDRA in Atmospheric Physics under Dr Weisheimer (24pm in WP2) also linking to the FP7 SPECS project on seasonal and interannual predictions. The PDRA in SoGE will work with the Met Office to extend models to include atmosphere-ocean-mixed-layer interactions and updated atmospheric physics (9pm in WP2). The use of distributed computing provides a valuable public outreach opportunity, which the **Oxford Climate Knowledge Exchange Fellow, Pete Walton**, will coordinate. Dr Walton will also contribute to the stakeholder engagement and interpretation of attribution research (3pm in WP1).

Short profile of key personnel involved:

Professor Myles Allen, FInstP, is Professor of Geosystem Science in the School of Geography and the Environment (SoGE) and Department of Physics, University of Oxford, and coordinator of the Oxford University Climate Research Network. His research focuses on how human and natural influences on climate contribute to observed climate change and risks of extreme weather and in quantifying their implications for long-range climate forecasts. He has served on the IPCC on Detection of Climate Change and Attribution of Causes for the 3rd & 5th Assessments and on Global Climate Projections for the 4th Assessment. Professor Allen is Principal Investigator of climate*prediction*.net, one of the world's most successful Citizen Science distributed computing projects, with an experienced team working with the UK Met Office and international partners performing the worlds largest ensemble climate modelling experiments. In 2010 he was awarded the Appleton Medal by the Institute of Physics.

Dr Antje Weisheimer: Antje Weisheimer is an NCAS Senior Research Fellow in Oxford's Physics Department (Atmospheric, Oceanic and Planetary Physics). Her research interests include: model-based weather and climate forecasts and the uncertainties associated with them; predictability on seasonal to decadal time scales; and seamless prediction of weather and climate. Weisheimer is also employed at the European Centre for Medium-Range Weather Forecasts (ECMWF) in Reading and is a Research Fellow at Wolfson College Oxford. Currently she leads a work package on Addressing Model Inadequacy in the EU FP7 project SPECS (Seasonal-to-decadal climate Predictions for the improvements of European Climate Services).

Partner 10 – Helmholtz-Zentrum Geesthacht Zentrum Fur Material- Und Kustenforschung GmbH (short name: HZG)

The *Helmholtz-Zentrum Geesthacht Zentrum für Material- und Küstenforschung GmbH* (HZG) is one of 18 members of the Helmholtz Association of German Research Centres. HZG is located in Geesthacht near Hamburg with a total staff of approximately 850 employees. The main HZG research areas cover materials science, as well as environmental research focussing on *marine, coastal and polar systems*. Research at HZG is both problem- and user-oriented and covers basic as well as applied research including the production of laboratory prototypes. About 68 % of HZG's annual budget (104 mill. Euro in 2011) is provided by the national federal and states governments, while 32 % are generated via additional income such as EU and national research projects, contract research, and licensing of HZG patents for products and processes. HZG maintains central administrative, financial, legal and project management departments providing its researchers with full support in all related issues. HZG has gained experience for years and has cultivated a successful tradition in both the co-ordination of and participation in different types of EU projects. Since the year 2000, researchers at HZG have coordinated some 35, and have participated in more than 110 EU projects co-financed by the European Commission through FP5, FP6 and FP7 priority programmes.
The *Institute of Coastal Research* is one of the institutes of HZG; its department "Systems' Analysis and Modelling" deals with climate, climate change and climate impact in coastal zones, with special emphasis on storms, storm surges and ocean waves. This work is done in close connection with various regional stakeholders; for building a dialogue with public, media and stakeholders a unit named "Norddeutsches Klimabüro" has been set up in 2006; in the staff of the institute there are several social scientists, who help to embed the scientific work into a social context.

Tasks assigned
Two groups of the Institute of Coastal Institute are involved in EUCLEA, namely the Norddeutsches Klimabüro, who will be responsible for the contribution to WP1 (surveying and interviewing public and stakeholders about concepts of detection and attribution and about the utility of the envisaged EUCLEA product), and the "Regional Climate" group2; which will be responsible for the storm surge case in WP4.

Short profile of key personal involved
Prof Dr. Hans von Storch: Director of "Systems' Analysis and Modelling" of Institute for Coastal Research, who is responsible for the strategic dimension of the contribution of HZG; as driving force behind the concept of regional climate service, and the implementation of such activities such as knowledge assessments on regional climate change for the Baltic Sea catchment (BACC) or the metropolitan region of Hamburg. Co-chair of BALTEX, a regional science body for the Baltic Sea. Member of IDAG (International Detection and Attribution Group) .(WP1,4)
Dr. Insa Meinke: Head of Norddeutsches Klimabüro, with experiences in multi-year interactions with different stakeholders and segments of the public in Northern Germany; doing surveys and running focus groups; building "products" (Norddeutscher Klimaatlas) for public use from institute's results. (WP1)
Dr. Dennis Bray: Sociologist, doing internet-based surveys among scientists and regional stakeholders since many years. Member of the project RADOST on climate change impacts and perceptions along the German Baltic Sea coast. (WP1)
Dr. Armineh Barkhordarian: Research scientist, who recently received her PhD for doing a comprehensive analysis of the consistency of ongoing climate change in the Mediterranean Sea region with scenarios of GHG-driven climate change; contributor to IDAG-activity. (WP4)

Partner 11 – Université de Versailles Saint-Quentin-en-Yvelines (short name : UVSQ)

Brief description of the organisation:
The Université de Versailles and Saint-Quentin-en-Yvelines (UVSQ) will participate in EUCLEIA through its "Observatoire des Sciences de l'Univers", the « Observatoire de Versailles and Saint-Quentin-en-Yvelines » (OVSQ). Specialised in climate, environment, and sustainability sciences, OVSQ has as research mandate to foster interdisciplinary science and graduate education. Its interdisciplinary approach and the complementary nature of its laboratories have created an incubator for new alliances, for emerging synergies and scientific progress. The observatory, with a strong commitment to research and international involvement, is a participant in leading-edge satellite observation programmes, contributes to international networks for environmental risk analysis, for environmental humanities, for global atmospheric monitoring and for understanding climate change, past, current and future. A spearhead of sustainable development for UVSQ, the Observatory groups five research labs, three transverse thematic groups, including one on environmental health; OVSQ counts more than 600 research staff/scientists and 650 graduate students. It brings together all the elements to be a force for climate, environmental and sustainability knowledge production.

Within its activities and the activities of its research laboratories, OVSQ has been, or still is, involved in the following programs that are of direct interest to UVSQ's contribution to EUCLEA:

"Innovative technologies for safer European coasts in a changing climate" (**THESEUS** FP7), leadership WP "Impact mitigation: resilient societies and economies".
"Improving Knowledge and Communication for Decision Making on Air Pollution and Health in Europe" (**APHEKOM**, European Commission's Programme on Community Action in the Field of Public Health funding), leading WP "Sharing Knowledge and Uncertainties with Stakeholders".
"a Transdisciplinary approach to the Emerging CHallenges of Novel technologies: Lifeworld and Imaginaries in Foresight and Ethics" (**TECHNOLIFE**, FP7) leading 3 WPs: "Deliberative process", "Database" and "Web portal".

Tasks assigned/Role in the project:
UVSQ will contribute to WP1 through theoretical conceptualization, methodological development and through an in depth analysis of the social dimensions of attribution/detection using heat waves in the greater Paris region (Ile-de-France) as case studies.

Short profile of key personnel involved:
Professor **Jean-Paul Vanderlinden:**
J.-P. Vanderlinden is professor of Environmental Studies and Ecological Economics at UVSQ. He is OVSQ's Associate Dean, and is leading the Environment-Science-Society research theme. Prof. Vanderlinden has extensive international experience through its involvement in FP6 and FP 7 projects, this as WP leader dealing either with Science-Policy-Integration of with the development of innovative participatory research methods. He is deeply involved in the analysis and facilitation of transdisciplinary research dynamics and as such serves as advisor to various research bodies both nationally and internationally. Before joining UVSQ in 2008, Prof. Vanderlinden was professor of Environmental Studies in Canada.

Professor **Yorghos Remwikos:**
Y. Remvikos is Professor of Environmental Health at UVSQ. He is OVSQ's co-leader of the Environmental Health research theme. After years of research on the biology of cancer, he is now devoting himself to different aspects of the relationship between environmental determinants and health, He is member of the scientific board the French research network SEnT: Health, Environment and Toxicology, financed by the Ile-de-France Region. Representing civil society in numerous regional occasions, he has also participated at the Grenelle de l'Environnement, in the work group « An environment respectful of health ». He presided over the working group on environ-mental inequalities of the Environmental Health Regional Plan for the Ile-de-France Region. Professor Remvikos has extensive international experience through partnerships in Europe and Africa. He has lead the "Sharing Knowledge and Uncertainties with Stakeholders" WP for the APHEKOM consortium.

2.3 Consortium as a whole

EUCLEIA brings together three National Met Services (Denmark, The Netherlands and UK) that ensure strong links to the WMO and eight Academic partners, recognised internationally as leading research centres.

The synergy present in EUCLEIA will facilitate new scientific developments that will provide the foundation of the attribution service to be realised within an operational context which regularly channels reliable attribution information to stakeholders and other users. The consortium will draw on the specialist expertise of the project partners who will each contribute building blocks of EUCLEIA that will be integrated into a reliable, well-tested, fit-for-purpose attribution service. Many members of the consortium are founder members of the Attribution of Climate-related Events (ACE) group, an informal grouping of scientists interested in developing the underpinning science needed for attribution of extreme weather and climate events.

The project includes experts in attribution science (eg IPCC Lead authors and Review Editors from Detection and Attribution chapters of IPCC; Met Office, CNRS-LSCE, UEDIN, UOXF), centres involved in the production of climate monitoring products and seasonal forecasts (Met Office, IC3, KNMI), experts in seasonal to decadal prediction (Met Office, IC3, Uni Reading), expertise in climate modelling and climate process studies (Met Office, ETH, UEDIN, DMI, Uni Reading, UOXF) and expertise in social science and the dissemination of knowledge in the climate science and attribution context (HZG, UVSQ). The participants therefore span the range of expertise needed for a project of this ambition; from the underpinning scientific expertise to its application in operational climate monitoring and prediction systems, via expertise in the social science aspects of climate information dissemination.

An additional attraction of the composition of EUCLEIA is that the partner organisations are involved heavily in the development of climate services. The Met Office has been instrumental in WMO's development of the Global Framework for Climate Services (GFCS) from co-organising the First International Conference on Climate Services in October 2011 which led to the creation of the Climate Service Partnership to involvement in writing the Implementation Plan for approval by WMO Extraordinary Congress. Furthermore many of the partner organisations are involved in EU projects aimed at developing climate services, including EUPORIAS, SPECS, NACLIM, and ECOMS, a European initiative for climate service observation and modelling, which is chaired by the Met Office.

The EUCLEIA consortium has strong links with end user organisations, involved in the project's activities as international scientific collaborators and stakeholders. As well as the engagement of partner organisations with stakeholder groups through engagement in projects like EUPORIAS, the partners in EUPORIAS have garnered interest from the insurance sectors, legal and media sectors specifically with event attribution services following the stakeholder focused day at the ACE meeting in September, 2012. For example, Zurich Insurance are interested in a state-of-the-art attribution service that will improve the ability of their businesses to make effective decisions in weather sensitive sectors, and the Lighthill Risk Network has committed to work with the project to connect academic expertise, to distill industry needs and to drive practical solutions that could have a significant benefit and impact to the insurance and reinsurance industries (see letters of support in Appendix).

2.4 Resources to be committed

(Note that all monetary figures in Section 2.4 are indicative and amounts presented here might differ from the budget figures in Part A and the GPFs. For example - due to the rounding to whole integers.)
The total cost of the EUCLEIA project is estimated at **4,250,895 €,** with the consortium requesting funding from the EC for **2,991,498 €. Therefore 30% o**f the total budget is mobilised by the consortium via matched funds. **409** person months (PM) have been offered to the project from the 11 partners.

2.4.1 Financial Planning for the Project

The majority of the funding for EUCLEIA is required for personnel costs, as the project will be relying on the skills and many years of expertise of the partner organisations involved. Therefore it was key that the budget was

calculated using an estimation of costs associated with the experts identified to deliver the project's objectives, and their role within the project. Thus, as the tasks and description of the work packages developed; the associated estimate of personnel resources developed. This iterative approach to calculating the required budget to deliver the work packages and the project as a whole will ensure a good estimate of the resources required, and associated funding required.
Partners were asked to estimate their own travel budget and other costs required. These requests were then challenged and compared to ensure consistency. When considering the travel required in this project, all partners and stakeholders will, as best practise, avoid unnecessary travel, and use alternative forms of communication (such as teleconference, Skype).

2.4.2 Distribution and Breakdown of Resources

2.4.2.1 Personnel Costs
Costs for personnel amount to 51% of the total project budget. A proportion of this is used to develop stakeholder engagement and to understand the interests of scientist's v public interests. Activity will be undertaken in two regions to ensure a good geographical spread and to make sure that EUCLEIA is capturing the requirements from areas with different lifestyles.

2.4.2.2 Management and Other Costs
199,665**€** (4.86%) of the total project budget will be used for the core project management activities (WP0.1 and WP0.3) [described in Section2.1]. The personnel costs will cover the EU Coordinator, a Project Manager, Science Coordinator and Project Administrator.

2.4.2.3 Other Direct Costs
290,462**€** of the total budget has been put aside for other direct costs (non-personnel costs). These costs are primarily associated with travel and workshops.
Table 2.4.2 provides a breakdown per partner of these other direct costs.

Table 2.4.2: Summary of Other Direct Costs

Partner	**Description of Cost**	**Value € (total budget)excluding overheads (indirect Costs)**	**Deliverable**	**Activity (i.e.RTD)**
1 Met Office	Travel and Subsistence costs for Met Office staff to attend meetings	7,500	WP0.1	MGT
1 Met Office	Travel and subsistence costs for the Science Coordinator	7,500	WP0.2	RTD
1 Met Office	Cost of hosting workshops, stakeholder and scientific collaborator travel costs	50,000	WP0.3	OTHER
2 ETH	Travel and subsistence costs	15,000		RTD
3 CNRS-LSCE	Travel and Subsistence	15,000		RTD
4 UEDIN	Travel and Subsistence	8,400		RTD
4 UEDIN	Travel and Subsistence for a PDRA to attend the meetings, Publication of 2 Scientific papers and computing costs (data processing, storage, software licences)	21,000		RTD
5 IC3	Travel and Subsistence	15,000		RTD
6 DMI	Travel and Subsistence	15,000		RTD
7 KNMI	Travel and Subsistence	17,500		RTD
7 KNMI	Publication charges	2,500		RTD

8 Uni Reading	Travel and Subsistence	10,640		RTD
8 Uni Reading	Server costs, HPC Contribution, computing budget for PDRA, Journal publication charges	12,377		RTD
9 UOXF	Travel and Subsistence	14,167		RTD
9 UOXF	Recruitment costs and provision of work stations	11,200		RTD
10 HZG	Travel and Subsistence	15,000		RTD
10 HZG	Survey costs	13,000	WP5	RTD
11 UVSQ	Travel and Subsistence	15,000		RTD
11 UVSQ	Survey costs	13,000	WP5	RTD

2.4.2.4 Sub-contracting

Subcontracts are only planned for non-core tasks,. Primarily in EUCLEAI these are audits only and each institution has appointed it auditors through a transparent and equal treatment methodology.

2.4.3 Resources that will complement the EU contribution

The following contributions to EUCLEIA are 'in kind' and will therefore enhance the offering of the project:

- Considerable involvement during the full duration of the project by numerous stakeholders from across the EU countries.
- Links with ACE
- Opportunities for publishing the findings of the project through the BAMS newsletter.
- Academic Publications undertaken by partners.

3. Impact

3.1 Expected impacts listed in the work programme

3.1.1. Expected impacts

1. Better understanding of current climate and weather-related risks
2. Improved credibility of climate services by the development of reliable attribution products placing recent weather and climate events in the context of climate variability and change
3. Improved business continuity and resilience of society to extreme weather and climate events
4. Improved climate change adaptation strategies for commercial activities and policy initiatives
5. Contribution to the World Meteorological Organisation (WMO) Global Framework for Climate Services

The main outcome of EUCLEIA will be the development and delivery of authoritative, reliable and regular assessments of the contribution of natural and anthropogenic factors to recent weather and climate events in Europe.

This contribution requires a European, rather than a national or local, approach, because by pooling European expertise it becomes possible to develop a world-leading quasi-operational attribution system for Europe. This will improve the ability of European citizens and businesses to deal with weather and climate risks. By bringing together the relevant expertise from across Europe, and by seeking to understand a variety of European stakeholder perspectives for attribution services, the aim of EUCLEIA is to contribute strongly to the development of European climate change adaptation strategies for both commercial and policy sectors. EUCLEIA will also engage with European citizenry so that they better understand climate risks and the ability of attribution science to elucidate them.

Attribution assessments will focus on five types of weather event associated with substantial impacts in Europe: heatwaves, cold spells, floods, droughts and storm surges. EUCLEIA will concentrate on the European region but will collaborate with scientific collaborators in other continents thereby enabling advances made in the science of event attribution in Europe to influence international partners in their development of attribution services for other regions.

It will allow stakeholders to understand how anthropogenic climate change and natural variability has contributed to the occurrence of recent extreme weather and climate events, thereby enabling stakeholders to better adapt to such events. Currently there can be a lot of speculative, confusing, and contradictory information about the links to climate change following extreme weather events. Misattribution, incorrectly attributing a particular weather event to anthropogenic or natural causes, could lead to poor adaptation decisions. On the other hand reliable information on the extent to which a particular class of extreme weather event in a particular location is becoming more or less likely under anthropogenic climate change is of great potential value to informing adaptation decisions and to directing adaptation funding appropriately.

EUCLEIA has been structured to maximise the impact of the research carried out in the proposal. A user panel representing the requirements of key sectors will be engaged throughout the project to ensure that the research is steered to develop useful products. Furthermore, WP1 includes a detailed study of stakeholders in two particular regions in order to enable an in depth analysis of the potential of attribution services to meet very specific user needs. In addition, there is a research strand in WP1 aiming to better understand public perception of attribution science and thereby develop improved protocols for public engagement, and there is an important training and outreach element envisaged, to enable the scientific knowledge gained in EUCLEIA to be widely disseminated to the academic research community and the wider public. Finally an Advisory Board will be constituted (see section 2), made up of distinguished experts in the field of monitoring, attribution and seasonal forecasting for the development of climate services. The Advisory Board will provide independent advice and recommendations to the project to guide it in achieving its aims.

A crucial aspect of EUCLEIA is the development of a quasi-operational attribution system (WP5) in close partnership with EUCLEIA stakeholders. The in depth nature of the engagement envisaged by EUCLEIA in the development of such an attribution system will lay the essential groundwork for attribution products to be fully embedded in future climate services. This will require well understood pre-defined methodologies, a sophisticated understanding of the application of such products in key sectors, and a capability to produce scientifically robust assessments on a regular and time-bound basis. Building these key elements into the project will enable EUCLEIA to contribute substantially towards the development of operational climate services in the climate change context of GMES.

3.1.2 Other national and international research activities

Development of Attribution science and Attribution Services
While the development of a quasi-operational attribution system for Europe requires a European approach, the work of EUCLEIA is well aligned with international research activities in the field of attribution science and the development of methodologies to attribute individual weather and climate events. We have assembled a strong team of international collaborators who are members of the IDAG group, an internationally respected group of attribution scientists (IDAG, 2005; Stott et al, 2010). EUCLEIA partners are founder members of the international Attribution of Climate-related Events (ACE) group, with the Scientific Steering Committee of the recent ACE meeting in Oxford being chaired by the EUCLEIA coordinator.

Development of Observations and Monitoring
EUCLEIA have active links to a number of European and international activities including leadership and membership of EURO4M and ECA&D in Europe, and membership of ISTI and the ETCCDI internationally.

Contribution to the WMO GFCS
The Met Office has strong links to the WMO GFCS through membership of the WMO Task Teams engaged in developing the GFCS implementation plan (Hewitt et al, 2012) and with the Met Office being a WMO Global Producing Centre for long range forecasts.

WCRP, IPCC
The coordinator of EUCLEIA led a position paper to the WCRP Open Science Conference in Denver, 2011, which is also co-authored by other EUCLEIA partners, and which sets out the case for development of event attribution systems and discusses the challenges involved in developing systems to provide regularly updated and reliable attribution assessments of unusual or extreme weather and climate-related events (Stott et al, 2012). One of the EUCLEIA partners (IC3) is a member of the WCRP Working Group on Seasonal to Interannual Prediction which is co-chaired by the Met Office. The EUCLEIA coordinator is a Coordinating Lead Author of the chapter on Detection and Attribution of Climate Change in Working Group I of the 5th Assessment Report of the IPCC and other EUCELEIA partners are coordinating lead authors, lead authors and review editors of others chapters in WGI (Met Office, CNRS-LSCE, KNMI, Edinburgh, Reading, Oxford), and EUCLEIA partners also include a core writing team member of the AR5 synthesis report (Edinburgh), and a lead author of WGII (HZG). In addition ETH lead investigator was a CLA of the IPCC SREX report.

3.2 Dissemination and/or exploitation of project results, and management of intellectual property

3.2.1 Dissemination and exploitation of project results
Measures proposed for dissemination

EUCLEIA has a number of means for disseminating and exploiting results. The continued engagement with the stakeholder community during the course of the project will be a key factor to the success of identifying deliverables that can be used by a range of sectors. The community comprises of four groups: the stakeholders defined in WP1 including regional managers, the general public, a stakeholder “user panel”, and the scientific

research community, where each group can be supported through specific engagement and communication activities.

Regional managers
WP1 is explicitly devoted to stakeholder engagement with a particular focus on regional managers, the insurance industry and the general public. WP1 will involve, from a social science perspective, an in-depth component to stakeholder engagement by investigating in detail stakeholder requirements for dealing with the impacts of heatwaves on public health in the Paris area and in dealing with the threat of storm surges along the German Baltic sea coast. Both partners, HZG and UVSQ, have developed good working relationships with regional and municipal authorities and other stakeholders in the two regions. As an example of this existing level of engagement, a survey of non-scientific users of scientific knowledge has already been conducted; "A survey of the perceptions of regional political decision makers concerning climate change and adaptation in the German Baltic Sea region" Bray and Martinez, 2011). The survey sample consisted of two groups of individuals. The first group (constituting the overwhelming majority of those targeted) consisted of the heads of local governments in the German states of Schleswig-Holstein and Mecklenburg- Vorpommern. The local governments targeted included cities, *Gemeinden* (municipalities) and *Ämter* (larger administrative divisions consisting of multiple *Gemeinden* and/or cities). Only those local governments located within the Baltic Sea drainage basin were targeted. The individuals targeted typically held the position of *Bürgermeister* (mayor) or *Amtsvorsteher* (superintendent of an *Amt*). These positions provide a survey sample of political stakeholders operating at a local level, while still possessing sufficiently significant decision-making power.

Stakeholder User Panel
A EUCLEIA stakeholder user panel will be constituted of representatives of key sectors including insurance, the legal sector and the water industry, who will meet regularly throughout the project to help guide the research to ensure its relevance from a stakeholder perspective. This engagement will be built on the successful ACE meeting held in Oxford in September, 2012, which included a very successful stakeholder day (see letter of support). Face-to-face workshops will be used throughout the project to allow the user panel and the scientists to openly discuss issues associated with the project and to inform the next phase, in a manner that facilitates genuine dialogue. It is envisaged to hold these workshops at the following milestones: 6 months, 18 months (start of WP4), and 34 months (end of the project).

In addition to the workshops, the user panel will be engaged with the research findings through webinars (quarterly) and an eNews letter (monthly). It is seen that there will be an opportunity to develop a dialogue through the webinars, although from experience, the technology does not allow the freedom of thought and discussion that face-to-face workshops have.

General Public

There will be a range of outreach to the general public through the dissemination of key scientific results, and through learning activities on attribution science. There will also be specific training modules aimed at early career researchers to increase the capacity within Europe of scientists to develop the understanding and application of attribution science.

WP1 will also poll the general public to identify gaps between the perceptions of the public and the scientific community concerning attribution, and WP1 will study the interests and views held by representatives of the insurance and re-insurance industries.

The continuing engagement with the public is an important aspect of EUCLEIA. As well as being able to inform the wider public of the ongoing results, the engagement process will be able to address the knowledge gaps identified in WP1. Because of the dispersed nature of the population, it would be necessary to deliver this through online resources. Pedagogically robust, digital learning resources will be developed to support understanding of key concepts and ideas crucial to understanding attribution science. Examples of these digital resources include: audio and video podcasts, blogs, briefing papers, discussion forums and webinars. An important part of the public engagement process is providing them with an opportunity to ask questions of the scientists and develop a dialogue

that will allow them to deepen their understanding through being able to contextualise the science. These resources can be used in isolation by training providers or as part of a coherent package that guides the learner in understanding a specific aspect of the science. The online courses will be maintained through a publically accessible managed learning environment, such as moodle, and through social networking sites, e.g. YouTube.

Dissemination through the broader media (radio, newspapers and television) will also allow the results of EUCLEIA to reach a pan-European public audience. This process will be facilitated through the use of press releases and interviews.

Scientific community

Scientists on the project will contribute to professional development courses by collaborating on existing and proposed summer schools where there are attribution components, e.g. the NCAS and NCCR summer schools.

Dissemination of research activities and results to academic audiences will enable EUCLEIA to inform the wider attribution science community of key findings. Such dissemination activities will include: the publishing of academic papers in high impact journals; contributing to the Bulletin of the American Meteorological Society annual attribution report; attending international conferences and workshops, such as EGU and the annual meetings of the IDAG and ACE groups.

Project website
A central project website will be created to coordinate internal communication and to facilitate external dissemination of information and results. It is increasingly being recognised that stakeholders are no longer content with being provided with a 'portal' of tools and resources, but rather they need guidance information to support their use and application. To this end, the website will not only communicate the results and 'quasi-operational' tools, but also include detailed information on how they can be used in the decision-making process and what other attribution science and understanding would be applicable. This central website will host the eLearning resources and act as a central point of information for further details following press releases.

Engagement with development of Climate Services
The Met Office is taking a leading role in the development of Climate Services with Met Office leading EUPORIA and with Chris Hewitt of the Met Office being chair of ECOMS, a European initiative for climate service observation and modelling, which consists of the NACLIM, SPECS and EUPORIAS projects. If successful we would seek to supplement our close internal project collaboration with seasonal forecasting with involvement in the ECOMS group, in order to support the development of information to aid society to prepare for, and manage, climate-related risks.

3.2.2 Management of intellectual property

The Consortium partners in the EUCLEIA project appreciate that properly managing intellectual property used and generated during the project shall be key to its overall success. The Partners shall adopt a strategy that encapsulates the guiding principles of FP7 and a suite of management protocols to deliver the objectives within that strategy. Furthermore, everything agreed by the partners will be consistent with the General Conditions of the FP7 Grant Agreements dealing with Intellectual Property. The SIMG will oversee compliance and ensure the protocols are fully integrated within all the activities undertaken by the project. The overall aim will be to maximise all developed intellectual property to its fullest extent to achieve maximum benefit for and on behalf of the stakeholders.
The Management Board will be the owner and the SIMG will be the Steward of all foreground intellectual property. The SIMG will identify foreground intellectual property, protect it in line with the partners' protocols and, thereafter, steward its future use. The SIMG will deal with all contentious issues that may arise during the lifetime of the project.
Background intellectual property will be catalogued and distributed under licenses to the partners who require it for use or development. Derived intellectual property will be handled in accordance with the agreements reached by

the partners. Each of the partners will have the right to exclude specific pre-existing know-how from the other partners access, as far as the restrictions are announced before the signature of the funding contract or before the effective joining of a new partner. The procedure to handle these cases will be settled in the Consortium Agreement.
Foreground intellectual property will be identified at the point of creation and steps taken to ensure its protection. Partners will respect their individual Intellectual Property Rights. In the event of an invention being the work of a single partner of the project and solely the result of individual intrinsic skills rather than shared knowledge, this partner will be the exclusive owner of the results, subject to granting access rights to the other partners where necessary for their execution of the project or to the use of their own results. The conditions will be fixed in the Consortium Agreement. For the case in which the designated owner of the results waives its option to start registration proceedings the SMIG will follow a procedure outlined in the Consortium Agreement to allow other project partners the opportunity to obtain or maintain such protection. All foreground Intellectual Property will be catalogued and made available under license. Interdependencies will be noted and cross referenced for ease of future use. Protocols will permit the use of background and foreground intellectual property together where interoperability is crucial to its optimised use.
The SIMG will be tasked with dissemination of foreground intellectual property, having due regard to the legitimate interest of each beneficial partner. The partners will provide unfettered access to as much of the foreground intellectual property where legitimate interests are not compromised. At all times the requirement of the FP7 Grant Agreement will be the minimum standard for the project to work under. All published work will contain reference to the research funding leading to the results.
Access rights will be considered on a case by case basis and where appropriate after consultation with the partners concerned.
All records will be maintained electronically, both locally and centrally (by the SIMG), providing reconcilable audit trails for the Commission.
IPR awareness training can be given for personnel working on the project; and the partners' legal teams will be engaged to provide support and advice on IPR matters.

3.2.3 Measures proposed to increase the likelihood of market uptake of project results

We will demonstrate the feasibility and utility of attribution products through the development of a quasi-operational attribution system. Two WPs provide demonstration activities. WP4 tests out the capabilities on a set of targeted test cases, while WP5 runs the quasi-operational system for a year producing regular results.
One delivery mechanism for outputs of the quasi-operational system is to publish reports in the annual BAMS attribution report and this provides an excellent opportunity both to establish the scientific credentials of these results but also to disseminate them to a wide scientific audience and via publicity materials and press releases to a wide public audience (the first BAMS attribution report published in July 2012 attracted considerable media attention). We will also work closely with the user panel and the stakeholders identified in WP1 to establish the utility of the attribution assessments produced and to determine the potential for market uptake of such attribution results by the insurance and legal sectors. Based on the experiences gained, task 5.4 provides a report on lessons learned and recommendations for further development of operational attribution systems.

4. Ethics Issues

The nature of the research proposed under this project means that there are no or very few ethical issues. The proposed research will be looking at attribution issues and products, allowing decision makers to make better informed decisions for their industries. Whilst there will be some work undertaken to understand the impacts of events (e.g. heatwaves) on human health, this work will focus on gathering data on populations rather than specific individuals.
There will be no research undertaken that requires the conduct of experiments using humans, human tissue, human embryos, human foetuses or animals.

ETHICS ISSUES TABLE

	Research on Human Embryo/ Foetus	YES	Page
	Does the proposed research involve human Embryos?	NO	
	Does the proposed research involve human Foetal Tissues/ Cells?	NO	
	Does the proposed research involve human Embryonic Stem Cells (hESCs)?	NO	
	Does the proposed research on human Embryonic Stem Cells involve cells in culture?	NO	
	Does the proposed research on Human Embryonic Stem Cells involve the derivation of cells from Embryos?	NO	
	I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	**YES**	

	Research on Humans	YES	Page
	Does the proposed research involve children?	NO	
	Does the proposed research involve patients?	NO	
	Does the proposed research involve persons not able to give consent?	NO	
	Does the proposed research involve adult healthy volunteers?	NO	
	Does the proposed research involve Human genetic material?	NO	
	Does the proposed research involve Human biological samples?	NO	
	Does the proposed research involve Human data collection?	NO	
	I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	**YES**	

	Privacy	YES	Page
	Does the proposed research involve processing of genetic information or personal data (e.g. health, sexual lifestyle, ethnicity, political opinion, religious or philosophical conviction)?	NO	
	Does the proposed research involve tracking the location or observation of people?	NO	
	I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	**YES**	

	Research on Animals	YES	Page
	Does the proposed research involve research on animals?	NO	
	Are those animals transgenic small laboratory animals?	NO	
	Are those animals transgenic farm animals?	NO	
	Are those animals non-human primates?	NO	
	Are those animals cloned farm animals?	NO	
	I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	**YES**	

	Research Involving non-EU Countries (ICPC Countries[20])	YES	Page
	Is the proposed research (or parts of it) going to take place in one or more of the ICPC Countries?	NO	
	Is any material used in the research (e.g. personal data, animal and/or human tissue samples, genetic material, live animals, etc) : a) Collected and processed in any of the ICPC countries?	NO	
	b) Exported to any other country (including ICPC and EU Member States)?	NO	
	I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	**YES**	

	Dual Use	YES	Page
	Research having direct military use	NO	
	Research having the potential for terrorist abuse	NO	
	I CONFIRM THAT NONE OF THE ABOVE ISSUES APPLY TO MY PROPOSAL	**YES**	

[20] In accordance with Article 12(1) of the Rules for Participation in FP7, 'International Cooperation Partner Country (ICPC) means a third country which the Commission classifies as a low-income (L), lower-middle-income (LM) or upper-middle-income (UM) country. Countries associated to the Seventh EC Framework Programme do not qualify as ICP Countries and therefore do not appear in this list.

5. Consideration of gender aspects

Approximately 27% of the scientists named by the partners as working on EUCLEIA are female. Two out of the eight WP leaders and co-leaders are female. This is a not particularly high proportion, but does indicate that females are an integral part of the EUCLEIA project.

The Consortium is aware of the importance of attracting more high quality female researchers into the sphere of scientific research. EUCLEIA will ensure it acts upon the EC recommendation through the FP7 'Science in Society Programme' to stimulate young people to take on science studies, and promote the progress of women in scientific careers. (http://ec.europa.eu/research/fp7/index_en.cfm?pg=society: FP7 'Science in Society' Programme). EUCLEIA will support equal participation between men and women within all activities of the project; whilst complying with legislation concerning gender equality. Although no gender issues relating to subject matter are expected in connection with this work, actions will be undertaken during the course of the project to promote and ensure gender equality in EUCLEIA.

5.1 Present Consideration of Gender Aspects by the Consortium

Many of the partners in EUCLEIA have gender action plans at the institutional level as part of their commitment to gender equality. These include programmes to raise awareness of the issues involved in gender equality, commitments to family friendly work practices and career breaks, and provision of child-care facilities. Organisational initiatives to encourage gender equality have high-level support within partner institutes. For example, the Met Office has an ongoing equality training programme, co-ordinated at Executive level, which is mandatory for all staff. In fact, the number of female employees at the Met Office has increased from 22% in 2007 to 28.9% in 2012.

5.2 Management of Gender Aspects

The promotion and monitoring of gender equality throughout the project will be the responsibility of the SIMG (see Section 2.1), through a specifically created project Gender Aspects Management Team. One of the first actions of the Team will be to produce a Gender Action Plan (GAP), which will be fully communicated to partners. The Team will be responsible for ensuring the GAP is applied throughout the project, and that a process is followed for monitoring gender equality. The GAP will encompass both internal and external participants, stakeholders and those involved in surveys and trials.
The Gender Action Plan will:

- Encourage recruitment of women at equal scientific merit; all job advertisement will state the project's commitment to equality and to a family-friendly working environment;
- Help the participation of women/working parents by utilising modes of communication that do not involve the necessity to travel (i.e. e-conferencing);
- Ensure all partners encourage flexibility in the working hours of individuals involved in project;
- Ensure all the consortium are aware of EU gender legislation, including advertising gender equality on internal websites.

The SIMG will encourage all partners to promote training opportunities to their project participants (for example,
the EC Research DG conducts training on understanding the gender aspects within scientists' research fields). An Annual Gender Action report will be produced by the Project Manager which will detail the extent to which actions promoting gender equality have been performed, and the levels of gender participation at all levels of the project, including the Management Board level.

Appendixes

1 References

Alexander, L. V., X. Zhang, T. C. Peterson, J. Caesar, B. Gleason, A. M. G. Klein Tank , M. Haylock, D. Collins, B. Trewin, F. Rahimzadeh, A. Tagipour, K. Rupa Kumar, J. V. Revadekar, G. Griffiths, L. Vincent, D. B. Stephenson, J. Burn, E. Aguilar, M. Brunet, M. Taylor, M. New, P. Zhai, M. Rusticucci, and J. L. Vazquez-Aguirre, Global observed changes in daily climate extremes of temperature and precipitation, *J. Geophys. Res.*, *111*, doi:10.1029/2005JD006290, 2006.

Allen, M. R., Liability for climate change, *Nature*, *421*, 892, 2003.

Association of British Insurers. Flooding: a partnership approach to protecting people, http://www.abi.org.uk/Publications/Flooding_A_partnership_Approach_to_Protecting_People1.aspx, 2001.

Barriopedro, D., E. M. Fischer, J. Luterbacher, R. M. Trigo, and R. García-Herrera, The Hot Summer of 2010: Redrawing the Temperature Record Map of Europe, *Science*, *332*, 220-224, 2011.

Boé J., and L. Terray, Uncertainties in summer evapotranspiration changes over Europe and implications for regional climate change, *Geophys. Res. Lett.*, *35*, doi:10.1029/2007GL032417, 2008.

Bray, D., A survey of the perspectives of climate scientists concerning climate change and climate science in the Baltic Sea basin. *International BALTEX Secretariat ISSN 1681-6471, Publication No. 48*, 2010.

Bray, D., and G. Martinez, A survey of the perceptions of regional political decision makers concerning climate change and adaptation in the German Baltic Sea region. *International BALTEX Secretariat, ISSN 1681-6471 Publication No. 50*, 2011.

Cattiaux, J., and P. Yiou, Contribution of atmospheric circulation to remarkable European temperatures of 2011, In *Explaining extreme events of 2011 from a climate perspective* [Peterson, T. C., P. A. Stott, S. Herring, eds.], *Bull. Amer. Meteor. Soc*., *93*, 1041-1067, 2012.

Christensen, O. B., and J. H. Christensen, Intensification of extreme European summer precipitation in a warmer climate, *Global Planet.Change*, *44*, 107-117, 2004.

Christidis, N., P. A. Stott, F. W. Zwiers, H. Shiogama, and T. Nozawa, The contribution of anthropogenic forcings to regional changes in temperature during the last decade, *Clim. Dynamics*, *39*, 1259-1274, 2012a.

Christidis, N., P. A. Stott, G. S. Jones, H. Shiogama, T. Nozawa, and J. Luterbacher, Human activity and warm seasons in Europe, *Int. J. Climatol.*, *32*, 225-239, 2012b.

Christidis, N., P. A. Stott, A. Scaife, A. Arribas, G. S. Jones, D. Copsey, J. R. Knight, and W. J. Tennant, A new HadGEM3-A based system for attribution of weather and climate-related extreme events, *J. Climate*, 2012c (in press).

Department for Environment, Food and Rural Affairs, *To What Degree Can the October/November 2000 Flood Events be Attributed to Climate Change?*, Final Report FD2304, DEFRA, London, 2001.

Diffenbaugh, N. S., J. S. Pal, F. Giorgi, and X. Gao, Heat stress intensification in the Mediterranean climate change hotspot, *Geophys. Res. Lett.*, *34*, doi:10.1029/2007GL030000.

Dole, R., M. Hoerling, J. Perlwitz, J. Eischeid, P. Pegion, T. Zhang, X.-W. Quan, and T. Xu, D. Murray, Was there a basis for anticipating the 2010 Russian heat wave? *Geophys. Res. Lett.*, *38*, doi:10.1029/2010GL046582, 2011.

Feyen, L., and R. Dunkers, Impact of global warming on streamflow drought in Europe, *J. Geophys. Res.*, *114*, D17116, doi:10.1029/2008JD011438, 2009.

Hamilton, E., R. Eade, R. J. Graham, A. A. Scaife, D. M. Smith, A. Maidens, and C. MacLachlan, Forecasting the number of extreme daily events on seasonal timescales, *J. Geophys. Res.*, *117*, doi:10.1029/2011JD016541, 2012.

Hegerl, G. C., F. W. Zwiers, P. Braconnot, N. P. Gillett, Y. Luo, J. A. Marengo Orsini, N. Nicholls, J. E. Penner, and P. A. Stott, Understanding and Attributing Climate Change. In *Climate Change 2007: The Physical Science Basis* [Solomon et al., (eds)], Cambridge University Press, 2007.

Hewitt, C, S. Mason, and D. Walland, The global framework for climate services, *Nature Climate Change*, advance online publication, 2012.

Hirschi, M., S. I. Seneviratne, V. Alexandrov, F. Boberg, C. Boroneant, O. B. Christensen, H. Formayer, B. Orlowsky, and P. Stepanek, Observational evidence for soil-moisture impact on hot extremes in southeastern Europe, *Nature Geoscience*, *4*, 17–21, 2011.

Hoerling, M., J. Eischeid, J. Perlwitz, X. Quan, T. Zhang, and P. Pegion, On the increased frequency of Mediterranean drought, *J. Climate*, *25*, 2146–2161, 2012.

IDAG (The International Ad Hoc Detection and Attribution Group), Detecting and Attributing External Influences on the Climate System: A Review of Recent Advances, *J. Climate*, *18*, 1291-1314, 2005.

Kenyon, J., and G. C. Hegerl, Influence of modes of climate variability on global temperature extremes, *J. Climate*, *21*, 3872–3889, 2008.

Kenyon, J., and G. C. Hegerl, Influence of modes of climate variability on global precipitation extremes, *J. Climate*, *23*, 6248–6262, 2010.

Koster, R. D. and co-authors, Regions of strong coupling between soil moisture and precipitation, *Science*, *305*, 1138-1140, 2004.

Meehl, G. A. and co-authors, Global climate projections. In *Climate Change 2007: The Physical Science Basis.* Contribution of Working Group I to the Fourth Assessment Report of the IPCC [Solomon et al. (eds)]. Cambridge University Press, 2007.

Mitchell, J. F. B., D. J. Karoly, G. C. Hegerl, F. W. Zwiers, M. R. Allen, and J. Marengo, Detection of climate change and attribution of causes. In *Climate Change 2001: The Scientific Basis.* Contribution of Working Group I to the Third Assessment Report of the IPCC [Houghton et al. (eds)]. Cambridge University Press, 2001.

Mueller, B., and S. I. Seneviratne, Hot days induced by precipitation deficits at the global scale, *PNAS*, *109*, 12398-12403, 2012.

Nature Editorial, Extreme Weather, *Nature*, *489*, 335-336, 2012.

Oldenborgh, G. J. van, How unusual was autumn 2006 in Europe?, *Clim. Past*, *3*, 659-668, 2007

Oldenborgh, G. J. van, A. van Urk and M. R. Allen, The absence of a role of climate change in the 2011 Thailand floods In *Explaining extreme events of 2011 from a climate perspective* [Peterson, T. C., P. A. Stott, S. Herring, eds.], *Bull. Amer. Meteor. Soc*., *93*, 1041-1067, 2012.

Otto, F. E. L., N. Massey, G. J. van Oldenborgh, R. G. Jones, and M. R. Allen, Reconciling two approaches to attribution of the 2010 Russian heat wave, *Geophys. Res. Lett.*, *39*, doi:10.1029/2011GL050422, 2012.

Pall, P., T. Aina, D. A. Stone, P. A. Stott, T. Nozawa, A. G. J. Hilberts, D. Lohmann, and M. R. Allen, Anthropogenic greenhouse gas contribution to flood risk in England and Wales in autumn 2000, *Nature*, *470*, 382-385, 2011.

Palmer T. N., F. J. Doblas-Reyes, A. Weisheimer, and M. J. Rodwell, Toward seamless prediction: calibration of climate change projections using seasonal forecasts, *Bull. Amer. Meteor. Soc.*, *89*, 459–470, 2008.

Peterson, T.C., P. A. Stott, and S. Herring, S. (Eds), Explaining Extreme Events of 2011 from a Climate Perspective, *Bull. Amer. Meteor. Soc.*, *93*, 1041-1067, 2012.

Quesada C. A. and co-authors, Basin-wide variations in Amazon forest structure and function are mediated by both soils and climate, *Biogeosciences*, *9*, 2203-2246, 2012.

Rahmstorf, S., and D. Coumou, Increase of extreme events in a warming world. *PNAS*, doi:10.1073/pnas.1101766108, 2011.

Ratter, B. M. W., K. H. I. Philipp, and H. von Storch, Between hype and decline: recent trends in public perception of climate change, *Environmental Science & Policy*, *18*, 3-8, 2012.

Rupp, D. E., P. W. Mote, N. Massey, C. J. Rye, R. Jones, and M. R. Allen, Did human influence on climate make the 2011 Texas drought more probable? In *Explaining extreme events of 2011 from a climate perspective* [Peterson, T. C., P. A. Stott, S. Herring, eds.], *Bull. Amer. Meteor. Soc*., *93*, 1041-1067, 2012.

Santer, B. D., T. M. L. Wigley, T. P. Barnett, and E. Anyamba, Detection of climate change and attribution of causes. In *Climate Change 1995: The Science of Climate Change.* Contribution of Working Group I to the Second Assessment Report of the IPCC [Houghton et al. (eds). Cambridge University Press, 1996.

Schär, C., P. L. Vidale, D. Lüthi, C. Frei, C. Häberli, M. A. Liniger, and C. Appenzeller, The role of increasing temperature variability in European summer heatwaves, *Nature*, *427*, 332-336, 2004.

Schiermeier, Q., Climate and weather: Extreme measures, *Nature*, *477*, 148-149, 2011.

Seneviratne, S. I., D. Lüthi, M. Litschi, and C. Schär, 2006, Land-atmosphere coupling and climate change in Europe, *Nature*, *443*, 205-209, 2006.

Seneviratne, S. I., T. Corti, E. L. Davin, M. Hirschi, E. B. Jaeger, I. Lehner, B. Orlowsky, and A. J. Teuling, Investigating soil moisture-climate interactions in a changing climate: A review, *Earth-Science Reviews*, *99*, 125-161, 2010.

Seneviratne, S. I and co-authors, Changes in climate extremes and their impacts on the natural physical environment. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* [Field, C.B. et al. (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge University Press, 2012.

Sheffield, J., Y. Xia, L. Luo, E. F. Wood, M. Ek, K. E. Mitchell, and the NLDAS Team, Drought Monitoring with the North American Land Data Assimilation System (NLDAS): A Framework for Merging Model and Satellite Data for Improved Drought Monitoring. In *Remote Sensing of Drought: Innovative Monitoring Approaches* [Wardlow, B. M. Anderson, and J. Verdin (eds.)], Taylor and Francis, London, 2012.

Shongwe, M. E., G. J. van Oldenborgh, B. J. J. M. van den Hurk, B. de Boer, C. A. S. Coelho, and M. K. van Aalst, Projected Changes in Mean and Extreme Precipitation in Africa under Global Warming. Part I: Southern Africa, *J. Climate*, *22*, 3819–3837, 2009.

Stephenson, D. B., C. A. S. Coelho, M. Balmaseda, and Doblas-Reyes, F.J., Forecast Assimilation: A unified framework for the combination of multi-model weather and climate predictions, *Tellus*, *57*, 253-264, 2005.

Stott P. A., D. A. Stone, and M. R. Allen, Human contribution to the European heatwave of 2003, *Nature*, *432*, 610-613, 2004.

Stott, P. A., N. P. Gillett, G. C. Hegerl, D. J. Karoly, D. A. Stone, X. Zhang, and F. Zwiers, Detection and attribution of climate change: a regional perspective, *WIREs Clim Change*, *1*, 192–211, 2010.

Stott, P A., M. Allen, N. Christidis, R. Dole, M. Hoerling, C. Huntingford, P. Pall, J. Perlwitz,, and D. Stone, Attribution of Weather and Climate-Related Extreme Events, Position Paper for WCRP OSC. Accepted as part of monograph of position papers. In Monograph : "Climate Science for Serving Society: Research, Modelling and Prediction Priorities" to be published by Springer. 2012.

Teuling, A. J., M. Hirschi, A. Ohmura, M. Wild, M. Reichstein, P. Ciais, N. Buchmann, C. Ammann, L. Montagnani, A. D. Richardson, G. Wohlfahrt, and S. I. Seneviratne, A regional perspective on trends in continental evaporation, *Geophys. Res. Lett.*, *36*, doi:10.1029/2008GL036584, 2009.

Teuling, A. J., S. I. Seneviratne, R. Stöckli, M. Reichstein, E. Moors, P. Ciais, S. Luyssaert, B. van den Hurk, C. Ammann, C. Bernhofer, E. Dellwik, D. Gianelle, B. Gielen, T. Grünwald, K. Klumpp, L. Montagnani, C. Moureaux, M. Sottocornola, and G. Wohlfahrt, Contrasting response of European forest and grassland energy exchange to heatwaves. *Nature Geoscience*, *3*, 722-727, 2010.

Trenberth, K. E. and co-authors, Observations: surface and atmospheric climate change. In *Climate Change 2007: The Physical Science Basis.* Contribution of Working Group I to the Fourth Assessment Report of the IPCC [Solomon et al. (eds)]. Cambridge University Press, 2007.

Trenberth, K. E., Observational needs for climate prediction and adaptation, *WMO Bulletin*, *57*, 17-21, 2008.

R. Vautard, P. Yiou, F. D'Andrea, N. de Noblet, N. Viovy, C. Cassou, J. Polcher, P. Ciais, M. Kageyama, and Y. Fan, Summertime European heat and drought waves induced by wintertime Mediterranean rainfall deficit, *Geophys. Res. Lett.*, *34*, doi:10.1029/2006GL028001, 2007.

Vautard, R., and P. Yiou, Control of recent European surface climate change by atmospheric flow, *Geophys. Res. Lett.*, *36*, doi:10.1029/2009GL040480, 2009.

Yiou, P., R. Vautard, P. Naveau, and C. Cassou, Inconsistency between atmospheric dynamics and temperatures during the exceptional 2006/2007 fall/winter and recent warming in Europe, *Geophys. Res. Lett.*, *34*, doi:10.1029/2007GL031981, 2007.

Yiou, P., K. Goubanova, Z. X. Li, and M. Nogaj, Weather regime dependence of extreme value statistics for summer temperature and precipitation, *Nonlin. Processes Geophys.*, *15*, 365–378, 2008.

2. Glossary of terms/acronyms

A

ABI: Association of **B**ritish **I**nsurers
ACE: Attribution of **C**limate-related **E**vents
AMOC: Atlantic **M**eridional **O**verturning **C**irculation
AMS: American Meteorological Society
ANR: French National Research Agency
APHEKOM: EU funded project on Improving Knowledge and Communication for Decision Making on Air Pollution and Health in Europe
AR5: IPCC Assessment Report 5
ATOPICA: FP7 project on atopic diseases in changing climate, land use & air quality

B

BACC: BALTEX assessment of climate change for the Baltic Sea basin
BALTEX: an interdisciplinary research network for the Baltic Sea region
BAMS: Bulletin of the **A**merican **M**eteorological **S**ociety

C

C20C: The climate of the 20th century project
CCI: Climate **C**hange **I**nitiative
CEA: Commissariat à l'**E**nergie **A**tomique
CFU: Climate **F**orecasting **U**nit
CICS: Cooperative **I**nstitute for **C**limate and **S**atellites
Climate-KiC: Knowledge **I**ntegration **C**ommunity that connects global and local, small and large partners from the private, public and academic sectors
CLIMRUN: Climate **L**ocal **I**nformation in the **M**editerranean region: **R**esponding to **U**ser **N**eeds
CMIP5: **C**oupled **M**odel **I**ntercomparison **P**roject, Phase **5**
CNRS: Centre **N**ational de la **R**echerche **S**cientifique; project partner
COMBINE: FP7 project on the Comprehensive Modelling of the Earth System for Better Climate Prediction and Projection
CORDEX: **CO**ordinated **R**egional climate **D**ownscaling **E**xperiment, WCRP-sponsored program
COSMO: DWD operational regional numerical weather forecasting model (**CO**nsortium for **S**mall-scale **MO**delling)
COSMO-CLM: Regional climate model based on COSMO
CSP: **C**limate **S**ervices **P**artnership

D

DEM: Demonstration
DENFREE: FP7 Project on **DEN**gue research **F**ramework for **R**esisting **E**pidemics in **E**urope
DG: Directorate **G**eneral
DROUGHT-CH: An FP7 project on the early recognition of critical drought and low flow in Switzerland
DROUGHT-R&SPI: Fostering European Drought Research and Science-Policy Interfacing
DWD: Deutcher Wetterdienst, German Weather Service

E

EC: European **C**ommission
ECA&D: European **C**limate **A**ssessment & **D**ataset project
EC-Earth: a European Earth System model based on ECMWF modelling systems
ECMWF: European **C**entre for **M**edium-Range **W**eather **F**orecasts

ECOMS: A European initiative for climate service observation and modelling
EMBRACE: FP7 project on **Earth system model bias reduction and assessing abrupt climate change**
ENSEMBLES: EU FP6 project
ERA-CLIM: European Reanalysis of Global Climate Observations project
ERC: European **R**esearch **C**ouncil
ES: Earth **S**ystem
ESM: Earth **S**ystem **M**odel
ESA: European **S**pace **A**gency
ETH: Eidgenössische **T**echnische **H**ochschule Zürich, Swiss Federal Institute of Technology; project partner
EU: European **U**nion
EUCLEIA: EUropean, **CL**imate and weather **E**vents: **I**nterpretation and **A**ttribution
EUCLIPSE: **E**uropean **U**nion **C**loud **I**ntercomparison, **P**rocess **S**tudy & **E**valuation Project
EUPORIAS: EUropean **P**rovision **O**f **R**egional **I**mpact **A**ssessment on a **S**easonal-to-decadal Timescale
EURO4M: European Reanalysis and Observations for Monitoring project.
EuroSIP: European Seasonal-to-Interannual Prediction

F

FAR: Fraction of **A**ttributable **R**isk
FORSA: a commercial German surveying company
FP: Framework **P**rogramme
4DVAR: Four-dimensional variational data assimilation
FP: Framework **P**rogramme

G

GAP: Gender **A**ction **P**lan
GCM: General **C**irculation **M**odel
GEOLAND: GMES Land Monitoring Service
GEWEX: Global Energy and Water Cycle Experiment
GFCS: Global **F**ramework for **C**limate **S**ervices
GLASS: Global **L**and/**A**tmosphere **S**ystem **S**tudy
GMES: EU-led initiative - **G**lobal **M**onitoring for **E**nvironment and **S**ecurity
GPC: Global **P**roducing **C**entre (for long-range forecasts)

H

HadAM3: The atmospheric component of the Hadley Centre Coupled Model HadCM3
HadGEM: Hadley **C**entre **G**lobal **E**nvironmental **M**odel
HadISST: Hadley Centre **S**ea **I**ce and **S**ea **S**urface **T**emperature data set
HadRM: The Hadley Centre regional model
HCCP: Met Office **H**adley **C**entre **C**limate **P**rogramme
HiGEM: High Resolution **G**lobal **E**nvironmental **M**odelling
HZG: Helmholtz-**Z**entrum **G**eesthacht (Centre for Materials and Coastal Research); project partner.

I

IC3: Catalan Institute of Climate Sciences; project partner
ICE 2 SEA: FP7 project on estimating the future contribution of continental ice to sea-level rise
IDAG: The **I**nternational Ad Hoc **D**etection and **A**ttribution **G**roup
IfK: German Institute for Coastal Research
iLEAPS: Integrated **L**and **E**cosystem-**A**tmosphere **P**rocesses **S**tudy
IMPACT2C: FP7 project on quantifying projected impacts under 2^0C warming
IPCC: Intergovernmental **P**anel on **C**limate **C**hange
IPR: Intellectual Property Rights
IPSL-CM: Institut **P**ierre **S**imon **L**aplace **C**limate **M**odel

K

KNMI: **K**oninklijk **N**ederlands **M**eteorologisch **I**nstituut; project partner
KPP: K-Profile **P**arametrization

L

LBNL: Lawrence Berkeley National Laboratory
LSCE: Laboratoire des **S**ciences du **C**limat et de l'**E**nvironment

M

MGT: Management
MOHC: Met Office Hadley Centre

N

NACLIM: FP7 project on the North Atlantic climate
NCAS: National **C**entre for **A**tmospheric **S**cience
NCDC: National **C**limatic **D**ata **C**enter
NCEO: National **C**entre for **E**arth **O**bservation
NERC: Natural **E**nvironment **R**esearch **C**ouncil (UK)
NIES: Japanese **N**ational **I**nstitute for **E**nvironmental **S**tudies
NIWA: New Zealand provider of atmospheric and aquatic science and associated commercial services
NOAA: National **O**ceanic and **A**tmospheric **A**dministration
NRT: Near **R**eal **T**ime

O

OeRC: Oxford **e-R**esearch **C**entre
OMI: Ozone **M**onitoring **I**nstrument
OVSQ: Observatoire de **V**ersailles and **S**aint-**Q**uentin-en-Yvelines

P

PCIC: Pacific **C**limate **I**mpacts **C**onsortium
PDRA: Post-**D**octoral **R**esearch **A**ssistant
PI: Principal **I**nvestigator
PM: Person **M**onths
PMIP: Paleoclimate **M**odel **I**ntecomparison **P**roject
PREDICATE: Mechanisms and Predictability of Decadal Fluctuations in Atlantic-European Climate Project
PRINCE2: Projects **IN C**ontrolled **E**nvironments

Q

QWeCI: FP 7 project on Quantifying Weather and Climate Impacts on Health in Developing Countries

R

RACMO: Regional **A**tmospheric **C**limate **Mo**del
RADOST: Regional Adaptation Strategies for the German Baltic Sea Coast
RAPID: NERC project on the causes of rapid climate change with a main focus on the role of the Atlantic Ocean thermohaline circulation
RAPID-WATCH: NERC project on Monitoring the Atlantic Meridional Overturning Circulation
RCC: Regional **C**limate **C**entre
RCM: Regional **C**limate **M**odel
RTD: Research and **T**echnological **D**evelopment

S

SIMG: Special Interests Management Group
SNF: Swiss National Science Foundation
SOC: State **o**f the **C**limate (BAMS annual report)
SOGE: School of Geography and the Environment, University of Oxford
SPECS: Seasonal-to-decadal climate Prediction for the improvement of European Climate Services
SREX: Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation
SACA&D: Southeast **A**sian **C**limate **A**ssessment **& D**ataset
SST: Sea **S**urface **T**emperature
SSTSI: Sea **S**urface **T**emperature and **S**ea-**I**ce

T

TEA-COSI: The **E**nvironment of the **A**rctic: **C**limate, **O**cean and **S**ea **I**ce
TECHNOLIFE: FP7 project on a **T**ransdisciplinary approach to the **E**merging **CH**allenges of **NO**vel technologies: **L**ifeworld and **I**maginaries in **F**oresight and **E**thics
TEMPEST: NERC Project on **T**esting and **E**valuating **M**odel **P**redictions of **E**uropean **ST**orms
THESEUS: Innovative technologies for safer European coasts in a changing climate project
THOR: FP7 Project **TH**ermohaline **O**verturning – at **R**isk**?**
TROPOMI: TROPOspheric **M**onitoring **I**nstrument

U

UEDIN: University of **Edin**burgh; project partner
UK: United **K**ingdom
UNFCCC: United **N**ations **F**ramework **C**onvention on **C**limate **C**hange
UOXF: University of **Oxf**ord, project partner
USA: United **S**tates of **A**merica
UVSQ: Université de **V**ersailles **S**aint-**Q**uentin-en-Yvelines; project partner

V

VALOR: VALue **O**f the **R**APID (Assessing the value of monitoring the AMOC)

W

WACMOS: Water **C**ycle **M**ultimission **O**bservation **S**trategy
WCRP: World **C**limate **R**esearch **P**rogramme
WMO: World **M**eteorological **O**rganisation
WP: Work **P**ackage
WRF: Weather **R**esearch and **F**orecasting Model
WWRP: World **W**eather **R**esearch **P**rogramme

3. Letters of Support

International Scientific Collaborators

1. NOAA's National Climatic Data Center (NCDC), the Cooperative Institute for Climate and Satellites (CICS) and the editor of the Bulleting of the American Meteorological Society State of the Climate Report

2. Lawrence Berkeley National Laboratory (LBLN)

3. National Institute of Environmental Studies (NIES), Japan

4. ARC Centre of Excellence for Climate System Science, Australia

5. National Institute of Water and Atmospheric Research (NIWA), New Zealand

6. Environment Canada

7. Pacific Climate Impacts Consortium, Canada

6. The International Ad Hoc Detection and Attribution Group (IDAG)

Stakeholders

1. The Lighthill Risk Network (LRN)

2. Zurich Insurance Group

3. Munich RE

4. Risk Prediction Initiative (RPI)

5. University of Houston Law Center

6. BfG, German Federal Institute of Hydrology

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL ENVIRONMENTAL SATELLITE DATA
AND INFORMATION SERVICE
NATIONAL CLIMATIC DATA CENTER
151 PATTON AVE ROOM 120
ASHEVILLE NC 28801-5001

November 6, 2012

Peter Stott
Met Office Hadley Centre,
FitzRoy Road
Exeter EX1 3PB
United Kingdom

Dear Dr. Stott,

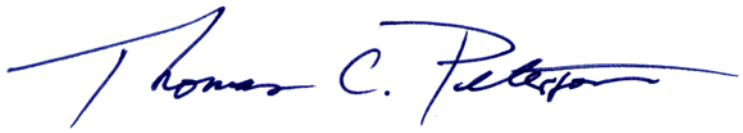
The project on *EUropean, CLimate and weather Events: Interpretation and Attribution* (EUCLEIA) would address an increasingly important and topical scientific challenge. Not only is at the leading edge of scientific analysis of attribution of extreme events but it also will be producing key information that decision makers at all levels need in order to effectively plan for the future where various types of extreme events may be becoming more or less frequent. This work area has been identified by NOAA leadership as a key focus area for future work. Therefore, we would be very interested in supporting this project by serving as international scientific collaborators.

NOAA's National Climatic Data Center (NCDC) and the Cooperative Institute for Climate and Satellites (CICS) are actively involved in a wide range of climate change analyses with a special emphasis on extreme events. For example, Dr. Peterson is the lead author on a paper entitled "Monitoring and Understanding Changes in Heat Waves, Cold Waves, Floods and Droughts in the United States: State of Knowledge" which is currently in review at the *Bulletin of the American Meteorological Society*. Dr. Thorne has been involved in the organization of the recent extreme event attribution workshop in Oxford. He is also a lead author on both Intergovernmental Panel on Climate Change and U.S. National Climate Assessment, both of which are directly relevant to EUCLEIA.

In addition, Dr. Peterson served last year and is serving again this year as the lead author and editor of the *Bulletin of the American Meteorological Society* paper Explaining Extreme Events of [the previous year] from a Climate Perspective. This activity received significant attention, for example, two months after it was published it was already the most read American Meteorological Society paper in the last 12 months, and NCDC intends to continue to work with our international partners to produce such a report as a companion to the annual State of the Climate report into the future. The synergy with EUCLEIA is clear as this annual report can serve as a forum for publishing the results coming out of EUCLEIA. Furthermore, the compilation of analyses by non-EUCLEIA authors in our annual report can help guide EUCLEIA on alternate methodologies worth pursuing and instigate international collaborations.

If the project were to be selected for funding we would greatly look forward to working with you and your European colleagues to further this important scientific endeavor. We have no doubt that this project and collaboration would move this topical research area forwards substantively.

Regards,



Dr. Thomas C. Peterson
Principal Scientist, NOAA's National Climatic Data Center
President WMO Commission for Climatology

Dr. Peter Thorne
Research Associate Professor
Cooperative Institute for Climate and Satellites

BERKELEY LAB
COMPUTING SCIENCES

Dr Peter Stott, EUCLEIA Project Coordinator
Dr Nikos Christidis, EUCLEIA Science Coordinator
Met Office Hadley Centre
FitzRoy Road Exeter EX1 3PB
United Kingdom

November 1, 2012

Re: Letter of support, **EUCLEIA**: EUropean, CLimate and weather Events: Interpretation and Attribution

Dear Peter and Nikos,

Thank you for your generous invitation to participate as international scientific collaborators on the EUCLEIA project. We view the assessment of the changing risk of extreme weather as one of the most important activities in our field and are excited by your project. We feel that collaboration on this work will be beneficial to both Europe and the United States. Our work on event attribution includes generation of tailored climate model experiments, development of systematic event attribution products, and management of coordinated event attribution projects. Clearly, our work is complementary to each other. From our side, we offer our climate model simulation results performed as part of the C20C (Climate of the 20th Century) project to all of the EUCLEIA participants without restrictions. We look forward to the interactions on theoretical, analytical, and practical aspects of this new field that we will gain from collaboration with EUCLEIA.

We look forward to great progress on this project in the months ahead.

Regards,

Michael Wehner Daithi Stone Pardeep Pall

Lawrence Berkeley National Laboratory
1 Cyclotron Rd., MS-50F
Berkeley, CA 94720

独立行政法人 国立環境研究所
地球環境研究センター
Center for Global Environmental Research

National Institute for Environmental Studies
Center for Global Environmental Research
16-2, Onogawa, Tsukuba, Ibaraki 350-8506, JAPAN
Tel: +81-29-850-2252 Fax: +81-29-850-2960
shiogama.hideo@nies.go.jp

3 November 2012

EUCLEIA Proposal

Dr. Peter Stott (Met Office; Coordinator for EUCLEIA),

I want to support the EUCLEIA proposal. I find the goals of EUCLEIA proposal very important in that it is trying to understand causes of recent extreme climate events, which is relevant to my research at National Institute for Environmental Studies (NIES). I have studied extreme climate events (e.g., Sugiyama et al. 2010), and I am now performing event attribution experiments using the MIROC5 model (Shiogama et al. in preparation). Attribution of extreme climate events can depend on models used for assessments. Therefore it is worthwhile to compare outputs from different models. Collaborations in the proposed project would be very helpful to understand uncertainties in attributions of extreme climate events. I believe that our successful collaboration so far (e.g., Shiogama et al. 2006, Christidis et al. 2012) can be continued fruitfully by the proposed project.

Yours sincerely,

Hideo Shiogama

Hideo Shiogama
Researcher, Center for Global Environmental Research, NIES

References

Christidis N., P. A. Stott, F. W. Zwiers, H. Shiogama, T. Nozawa, The contribution of anthropogenic forcings to regional changes in temperature during the last decade. Climate Dynamics 39, 1259-1274, 2012

Shiogama H., N. Christidis, J. Caesar, T. Yokohata, T. Nozawa, S. Emori, Detection of greenhouse gas and aerosol influences on changes in temperature extremes. Scientific Online Letters on the Atmosphere 2, 152-155, 2006

Sugiyama M., H. Shiogama H, S. Emori, Precipitation extreme changes exceeding moisture content increases in MIROC and IPCC climate models. Proceedings of the National Academy of Sciences of the United States of America 107, 571-575, 2010

Professor A.J. Pitman
Director, ARC Centre of Excellence for
Climate System Science

Dr. Peter Stott
Coordinator for EUCLEIA
Head, Climate Monitoring and Attribution
Met Office Hadley Centre
Fitzroy Road, Exeter EX1 3PB , UK

15th November 2012

Dear Dr Stott,

I am writing to offer enthusiastic support from the ARC Centre of Excellence for Climate System Science for the EUCLEIA (EUropean, CLimate and weather Events: Interpretation and Attribution) proposal that you are leading. The goal of the proposal, to develop an attribution system for European extreme weather that will provide well verified assessments on the extent to which certain weather-related risks have changed due to human influences on climate, complements a closely related research project on Australian extreme weather within our Centre.

The Centre of Excellence for Climate System Science (CoE CSS) was established in 2011 as a major initiative funded for seven years by the Australian Research Council. The Centre is an international research consortium of five Australian universities and a suite of outstanding national and international Partner Organizations, including the UK Met Office. It is building on and improving existing understanding of the modeling of regional climates to enable enhanced adaptation to and management of climate change, particularly in the Australian region. Research within our Centre is organized into five research programs, including an Extremes program that is undertaking research on risks, mechanisms, and attribution of changes in Australian climate extremes.

Prof David Karoly and Dr Lisa Alexander, joint leaders of the Extremes program, are keen to be active scientific collaborators in EUCLEIA. They are internationally recognized experts in climate change attribution and climate extremes and both are involved in the preparation of the IPCC Fifth Assessment Report, as a Review Editor and a Lead Author respectively.

The EUCLEIA project will be an international landmark project on attribution of extreme weather and climate events. We see great benefit in being involved in EUCLEIA as it will provide us with the opportunity of comparing our methods for attribution of extremes with the methods developed and used in EUCLEIA, as well as testing those methods on Australian extreme events. Our Extremes project and EUCLEIA will be strengthened by sharing research experiences as part of the international *Attribution of Climate-related Extremes* (ACE) project in the new Grand Challenge of the World Climate Research Programme on *Prediction and Attribution of Extreme Events*. We expect to participate in EUCLEIA by supporting visits by Centre researchers to EUCLEIA participating organisations and by hosting EUCLEIA visitors in Australia.

We wish you success with the EUCLEIA proposal and look forward to being an active international collaborator in this important project.

Yours Sincerely,

Professor A.J. Pitman, *Director of the ARC Centre of Excellence for Climate System Science*

ARC Centre of Excellence for Climate System Science
University of New South Wales
Sydney, NSW, Australia, 2052
Tel: +61 2 9385 7075 Fax: +61 2 9385 7123
Email: a.pitman@unsw.edu.au

Dr Peter Stott,
UK Met Office,
Coordinator for EUCLEIA

Tuesday the 13th of November, 2012

Dear Peter,

I am writing to you to express my personal support, and that of my organisation, for the EUropean, CLimate and weather Events: Interpretation and Attribution) project (EUCLEIA). This project addresses a scientific aspiration of great importance: the provision of robust quasi-operational information on the changing risk of extreme weather events.

My organisation, the National Institute of Water and Atmospheric Research (NIWA), is a New Zealand-based, government-owned, research and consultancy company. The climate group within NIWA undertakes fundamental research into climate variability and change, as well as being at the forefront of delivering climate information and services to the New Zealand public. For a number of years NIWA has funded research into the detection and attribution of climate change in New Zealand. Recently our focus has turned to whether human influences on climate have specifically changed the risk of extreme weather events. Our current research sets out to give a thorough assessment of the changes in risk of certain historical New Zealand weather events, especially dangerous and damaging floods. However, the delivery of such information to the public in a fashion which is timely with regard to an actual extreme event is the ultimate ambition of any such research programme.

EUCLEIA represents a cutting-edge opportunity to develop the methodologies and techniques necessary to deliver on this ambition. It brings together the top scientists in Europe to work collaboratively on the problem. As a result I have no doubt that the project will fulfil its objectives. It is of significant value to myself, and my colleagues at NIWA, to learn from the experiences gained by the EUCLEIA team. We expect our own research to be guided by the results of the project, and will offer any insights we may have to assist the team in their work.

Yours Sincerely,

Dr Sam Dean,
Climate Scientist,
NIWA,
Wellington, New Zealand.

National Institute of Water & Atmospheric Research Ltd, 41 Market Place, Auckland Central 1010
Private Bag 99940, Newmarket, Auckland 1149, New Zealand. Phone +64-9-375-2050, Fax +64-9-375-2051

GOVERNMENT OF CANADA
Environment Canada

GOUVERNEMENT du CANADA
Environnement Canada

ENVIRONMENT CANADA
CANADIAN CENTRE FOR CLIMATE MODELLING AND ANALYSIS
UNIVERSITY OF VICTORIA
P.O. BOX 3065 STN CSC
VICTORIA, BRITISH COLUMBIA
CANADA V8W 3V6

Name: Gregory Flato
Tel. (250) 363 8233
Fax (250) 363 8247

E-mail: Greg.Flato@ec.gc.ca

16 November, 2012

Dear Dr Stott,

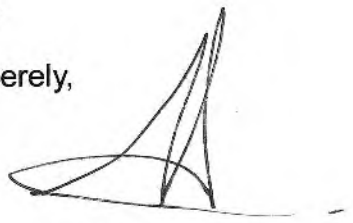
I am writing in my position as Acting Director of the Climate Research Division of Environment Canada to express my strong support for the European Climate and Weather Events: Interpretation and Attribution (EUCLEIA) proposal, and for the involvement of EC Research Scientists Dr Xuebin Zhang and Dr Nathan Gillett as collaborators in that proposal.

The role of Climate Research Division of Environment Canada is to conduct and support scientific research to advance understanding of the climate system, in order to explain its past and current state and behavior, and to predict and simulate its future state. Our research provides a basis for services and products for Canadians, and Canadian and international policy development. Given the current state of understanding of the causes of climate change, and the fact that climate extremes often have very substantial impacts on society and natural systems, research into the detection and attribution of the human influence on climate extremes is a high priority.

EUCLEIA deals with the issue of the attribution of extreme events, an issue of considerable interest to our stakeholders. The team of European investigators on the proposal are uniquely qualified to pursue research in this area, and to develop the science of event attribution. This activity allies closely with our own interest in detection and attribution, and with a planned project on attribution of cryospheric events, in which our group is strongly involved. By working closely with the EUCLEIA team, Dr Zhang and Dr Gillett will be among the first to benefit from the new techniques and science developed by the EUCLEIA team, while contributing their expertise and the experience of our group to the project, including through their participation at annual project meetings.

I wish you every success with the proposal.

Sincerely,



Dr Gregory Flato

Acting Director,
Climate Research Division, Environment Canada

PACIFIC CLIMATE IMPACTS CONSORTIUM

University of Victoria

November 14, 2012

Dr. Peter Stott,
Met Office
Coordinator for EUCLEIA

Dear Dr. Peter Stott,

RE: European Climate and weather Events: Interpretation and Attribution (EUCLEIA)

The Pacific Climate Impacts Consortium (PCIC) is pleased to express our support for the EUCLEI project. PCIC is a Canadian not-for-profit corporation dedicated to furthering the application of climate research. We are situated on the University of Victoria (UVic) campus in Victoria, British Columbia, Canada and operate as a regional climate service centre. PCIC conducts quantitative studies on the impacts of climate change and climate variability primarily in the Pacific and Yukon region of Canada. We have expertise in past and future climate analysis, hydrology, extreme climate event analysis and scientific programming and analysis.

PCIC's applied research program is designed to bring the most up to date scientific information forward to regional stakeholders. To accomplish this goal, PCIC engages in research partnerships with individual and institutions across Canada and internationally. The proposed EUCLEI project facilitates research collaboration among leading scientists and research institutions to advance our understanding of human influences on climate. Among other areas, PCIC has interest in the project's goals relating to

- attribution methodology and study designs (WP2 and WP3),
- the development and application of fast-track response capabilities that could, in part, be based on the results of conventional detection and attribution research (WP5),
- improve the engagement of user groups in the articulation and development of attribution products (WP1).

These project objectives are of strong interest to PCIC as we endeavour to serve our regional stakeholders, and would engage us in research that builds on previous collaborations with MetOffice scientists. The first two are areas in which PCIC has specific scientific capacity and interest. The third will be relevant to our work with regional user groups.

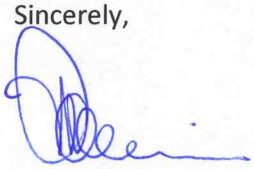
The goals of the proposed project are of broad interest to PCIC stakeholders, who very frequently ask questions about whether human influence on the climate has contributed in some way to the extreme events that affect the region. By working with this particular group of partners, PCIC will be able to develop capabilities and insights that will help it to better

Pacific Climate Impacts Consortium, University of Victoria, PO Box 3060 STN CSC, Victoria, BC V8W 3R4 Canada
Tel: (250) 721-6236 Fax: (250) 721-7217 E-mail: climate@uvic.ca

serve stakeholders in our region in this way, and the Canadian public more broadly. The development of a quasi-operational attribution system as proposed by EUCLEI will serve as an important step in answering these questions, and will potentially provide the blueprint for the implementation of such systems elsewhere, such as on the west coast of North America.

In summary, we strongly support the development of the EUCLEI project and are committed to collaborating with its researchers on this important project.

Sincerely,



Prof. Francis Zwiers
Director, Pacific Climate Impacts Consortium

Pacific Climate Impacts Consortium, University of Victoria, PO Box 3060 STN CSC, Victoria, BC V8W 3R4 Canada

Tel: (250) 721-6236 Fax: (250) 721-7217 E-mail: climate@uvic.ca

CLIMATE CENTRAL

Boulder, November 2, 2012

To: Dr. Peter Stott, Met Office, EUCLEIA coordinator

Subject: Intent of collaboration for the EUCLEIA proposal.

Dear Dr. Stott

I am writing both as the coordinator of the International ad-hoc Detection and Attribution Group (IDAG) and personally to confirm that I strongly support the EUCLEIA project and I, together with the other members of the group, would be excited to collaborate on the research aspects that underpin the proposed activities.

IDAG as a whole and I as an individual have been interested in the new direction of research of event attribution since its inception. I believe that significant progress will be made by the interweaving of expertise and interests, by concrete collaborations on specific projects and by regular meetings that the successful funding of this project would support.

As a research scientist at Climate Central I am also particularly interested in the operational and communication aspects of the problem of event attribution and I look forward to collaborating on those as well as the more basic research themes.

I wish you success in your application and I look forward very much to collaborating with your team on this project.

Yours sincerely,

Claudia Tebaldi, Research Scientist, Climate Central

One Palmer Square • Suite 330 • Princeton • New Jersey • 08542
T 609.924.3800 F 609.924.3882 E info@climatecentral.org W www.climatecentral.org

November 16th 2012

Dr Peter Stott *(Met Office; Coordinator for EUCLEIA)*

Offer of support for the EUCLEIA proposal.

The identification and understanding of the impacts of human activity on weather is key. Our industry has a key function to quantify and establish the impact of weather and in particular extreme weather.
The inherent uncertainty and normal variance in weather patterns only make this process more difficult and signals for climate change are hard for us to make practical decision from at the moment.
This study would hopefully provide us with very useful information that would enable us to better understand some of the key issues in this area. This would not only benefit the insurance industry but society as a whole whom ultimately we serve.

As an organisation directed and supported by Industry we will work with the academic team to connect academic expertise, to distill Industry needs and to drive practical solutions that could have a significant benefit and impact to the UK and global insurance and reinsurance industry.

About the Lighthill Risk Network
http://www.lighthillrisknetwork.org/lrn/index.html

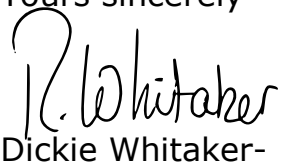
The Lighthill Risk Network is an industry backed body that exists to facilitate innovation and thus success, in science, the financial services industry and in society as a whole, by creating a dynamic network of contacts that links researchers with Risk bearers and Risk managers worldwide.

The Lighthill Risk Network is an all encompassing and inclusive organisation with the specific aim to facilitate and enhance knowledge transfer into business from academic, government and commercial experts at the forefront of risk-related research.

Lighthill Risk Network | 4th Floor | Tower Place East | London, EC3R 5BU |
Tel: +44 (0)20 7357 2616 | **Fax**: |44(0)20 7357 1460 |
Email: office@lighthillrisknetwork.org | **Website**: www.lighthillrisknetwork.org

It is a cost effective not-for-profit organisation that is funded by industry and government and we are managed by a core team of professionals from (re)insurance, science and engineering. By utilising the expertise from each sector, the Lighthill Risk Network is in a unique position of being able to link our extensive academic knowledge to the research needs of industry. The funding members are Lloyd's, Catlin. Aon Benfield and Guy Carpenter. Lloyd's is the largest Insurance market in the world, Catlin is a large multi national Insurer and Reinsurer and Aon Benfield and Guy Carpenter are the fisrt and second largest Reinsurance Brokers in the world.

Yours sincerely



Dickie Whitaker- Director

ZURICH

16 November 2012

Dr Peter Stott *(Met Office; Coordinator for EUCLEIA)*
Met Office Hadley Centre
FitzRoy Road
Exeter EX1 3PB United Kingdom
+44 (0)1392 886646

Dear Dr. Stott,

This letter will confirm the interest of Zurich Insurance Group in climate attribution services and my specific interest in serving as a stakeholder in the development process.

As a global insurer with headquarters in Europe, we are most interested in the EUCLEIA efforts to deliver a state-of-the-art attribution service that will help improve the ability of our businesses, and other stakeholders (regional and national authorities, and citizens) to make effective decisions in weather-sensitive sectors.

Extreme weather events affect our business directly and those businesses and lives of our customers and stakeholders. Improvements in attribution science and forecasting would assist us to continue to deliver informed risk management advice to our customers with respect to extreme weather events including but not limited to rain, flood, drought etc..

We have worked with the Met Office and their collaborators, Oxford University, on many occasions and find that their skills are unique. Further, interactions with the office to date demonstrate that when we provide input as a stakeholder in such processes, ultimate products and services are improved for both Zurich and researchers.

We look forward to working to provide meaningful input as a stakeholder to the development of attribution services products and services,

Should you have any questions, please contact me at lindene.patton@zurichna.com.

Sincerely,

Lindene E. Patton

Lindene E. Patton
Chief Climate Product Officer
Mythenquai 2
P.O. BOX 8022
Zurich Switzerland

Dr. Eberhard Faust
Head of Research: Climate Risks and Natural Hazards

Munich RE

20. November 2012

Dr. Peter Stott
Coordinator for the EUCLEIA project proposal
Met Office Hadley Centre
Fitz Roy Road
Exeter EX1 3PB
United Kingdom

LETTER OF SUPPORT

Munich Re is interested in the results of the drafted project EUCLEIA under the FP7 SPACE Call and considers itself as a potential stakeholder of this project. We confirm stakeholder support for the EUCLEIA proposal.

As a reinsurance company, Munich Re takes peak risk related to natural catastrophes from local insurance markets all over the world. The risk is diversified across various markets situated in the continents of the globe, thereby benefitting from non-correlated regional natural hazard regimes as a first approximation. Thus, a global business placement is a key element of a large reinsurer's business model. The inherent diversification potential would be reduced if losses were driven up at the same time in various markets by anthropogenic climate change. In this case, increasing losses would not be balanced by an equivalent rise in sums insured and associated premiums. This would pose a problem for the viability of the insurance system that needs to be based on risk-adequate premiums.

Munich Re is interested in improving scientific knowledge on the attribution of hazardous weather events to natural climate variability and anthropogenic climate change as aimed at by the EU-CLEIA proposal. As a consequence, the EUCLEIA proposal could contribute to our knowledge on the share in disaster losses that might be due to climate change as an external driver.

As a stakeholder's contribution, Munich Re commits feedback on the project targets and planned output. It can also offer input on relevant test cases of European weather disasters (Munich Re has developed the most comprehensive global damage and loss database). Munich Re can deliver its feedback and relevant comments, for instance, at the annual project meeting.

ppa. Faust

Dr. Eberhard Faust

Münchener Rückversicherungs-Gesellschaft
Aktiengesellschaft in München
Königinstraße 107
80802 München
Briefe: 80791 München

Tel.: +49 (89) 3891-4939
Fax: +49 (89) 3891-74939
EFaust@munichre.com
www.munichre.com

RPI2.0
Connecting Science and (Re)Insurance

Risk Prediction Initiative 2.0
Bermuda Institute of Ocean Sciences, Inc., 17 Biological Station, GE 01, Bermuda
Tel: (441) 297-1880; Fax: (441) 297-2890; www.bios.edu/rpi/

16 November 2012

Dear Sir or Madam,

Herewith we want to confirm that the Risk Prediction Initiative (RPI) supports the EUCLEIA proposal from the stakeholder perspective and hope that this proposal will receive funding.

Based in Bermuda, the risk capital of the world, RPI*2.0* works to create effective and efficient dialogue between scientists and (re)insurers involved in catastrophic risk. As a membership organization, RPI*2.0* represents a consortium of reinsurance companies. Situated within the Bermuda Institute of Ocean Sciences (BIOS), RPI*2.0* showcases academic research relevant to the insurance and (re)insurance industries and assists in translating this research into usable, meaningful results for its member companies. Thereby, RPI*2.0* has successfully linked science and industry since 1995.

We believe that EUCLEIA is a very promising initiative, as it brings in a lot of expertise in the field of attribution of extreme events with world-class scientists who have demonstrated their ability to produce highly valuable results and applications in the field of climatic extremes. The outline of the project seems to have the ability to overcome the technical and intellectual challenges in providing attribution statements that are useful for society in general and have a particular importance for insurance. The applications of attribution in insurance are twofold. First, attribution is a tool to highlight which of the high-loss events today are becoming more likely in the future with anthropogenic climate change signals increasing and is thereby relevant on a strategic level for insurance. Secondly, extreme event attribution has an increasing relevance for climate change litigation in the insurance context. Existing cases of climate change litigation indicate the likelihood of significant liability exposure for the insurance industry. The ability to attribute extreme events to anthropogenic emissions is certainly the basis for any further legal debate about liability and therefore of particular importance.

We see the EUCLEIA as very timely, as both insurance applications of attribution are now starting to become relevant, and will increasingly do so over the coming decade as climate change signals in extreme events are starting to emerge. To build up the capacities for attribution now for the foreseeable demand tomorrow will be of huge benefit.

RPI*2.0* wants to be involved in the project to advice on how to design the attribution service in order to make sure we meet the demands for it being useful for the insurance industry as a stakeholder group and potential user of the project outcomes.

With best regards,

Falk Niehorster (RPI Program Manager)

U N I V E R S I T Y *of* H O U S T O N

Law Center

100 Law Center
Houston, TX 77204-6060

713/743-2100

November 15, 2012

Dr. Peter Stott
Coordinator for EUCLEIA
Met Office
Hadley Centre
Fitzroy Road
Exeter EX1 3PB
United Kingdom

Re: Participation in EUCLEIA as stakeholder

Dear Dr. Stott,

Thank you for inviting the University of Houston Law Center (UHLC) to participate as a stakeholder in the EUCLEIA initiative. We would very much like to join this effort, and we look forward to working with you on legal questions, risk communication issues, and any other areas where EUCLEIA would like our assistance.

UHLC's Environment, Energy and Natural Resources (EENR) Center explores legal issues at the intersection of environmental and energy law, regulations and policy. In that capacity, we closely scrutinize emerging issues related to climate change law as well as any new technologies that could help identify and assess the growing impacts of climate change. For example, the EENR Center has previously reviewed the potential consequences of lawsuits seeking to hold emitters of greenhouse gases liable for damages caused by climate change, and we have also explored the application of U.S. and international environmental laws to proposed climate engineering projects. In that capacity, we have a keen interest in the potential legal ramifications of a credible and timely climate attribution service. We would gladly provide our expertise to help identify and assess possible legal consequences of attribution statements or scientific analyses that calculate attributable changes in climate risks or human influences behind specific weather events.

We believe that EUCLEIA offers a rare and excellent opportunity to discern and analyze these important issues. As the EENR Center gains greater knowledge of emerging climate attribution techniques through its work as a EUCLEIA stakeholder, we hope that our ability to offer cogent and useful legal analyses of

these issues will also grow. We also expect that our stakeholder input could help EUCLEIA to navigate potential liability and legal issues that might arise from an operating climate attribution service as well as to craft risk communications in an effective and legally usable manner.

I will serve as the primary contact for the EENR Center and the University of Houston Law Center for any EUCLEIA stakeholder activities where we can play a useful role. Please feel free to call me at any time if you have any questions or need additional information. Until then, we look forward to working with EUCLEIA and its other stakeholders in the near future.

Best wishes,

Prof. Tracy Hester
Director, Environment, Energy & Natural Resource Center
University of Houston Law Center

Bundesanstalt für Gewässerkunde

Am Mainzer Tor 1
56068 Koblenz

Postfach 20 02 53
56002 Koblenz

Tel.: 02 61 / 13 06-0
Fax: 02 61 / 13 06-53 02

E-Mail: posteingang@bafg.de
Internet: www.bafg.de

Bundesanstalt für Gewässerkunde, Postfach 200253, 56002 Koblenz

Dr Peter Stott
Coordinator for EUCLEIA
Met Office
FitzRoy Road

Exeter, Devon EX1 3PB
United Kingdom

M2/834.25/4408	*Mein Zeichen (bei Antwort angeben)*
5325	*Durchwahl*
Nilson@bafg.de	*E-Mail*
Dr. E. Nilson	*Bearbeiter(in)*
16.11.2012	*Datum*

Letter of Support

Dear Dr Stott,

the German Federal Institute of Hydrology (*Bundesanstalt für Gewässerkunde - BfG*) advises federal ministries, such as the Federal Ministry of Transport, Building and Urban Development (*BMVBS*) and the Federal Ministry of the Environment, Nature Conservation and Nuclear Safety (*BMU*) as well as the Federal Waterways and Shipping Administration (*WSV*) in matters regarding the utilisation and management of the German federal waterways. As a scientific institution ranking as a supreme federal agency, the *BfG* has a central mediating and integrating function. Being part of the *BMVBS*, it also has the mission to contribute to the maintenance and operation of the waterways as an efficient and environment-friendly transport system.

Over the last decade, the need has increased for more and in-depth knowledge about the effects of climate change on the hydrology, the aquatic environment, and, in particular, the efficiency of the federal waterways and the resulting consequences for the users of waterways transport. This finds its expression in the establishment of the research programme *KLIWAS* "Impacts of Climate Change on Waterways and Navigation in Germany" (www.kliwas.de) by the *BMVBS*, with the *BfG* acting as lead organization and in the participation in European research activities like the FP7 ECCONET or the INTERREG IV AdaptAlp projects. Within this research framework the simulation of extremes has been identified as particularly relevant and particularly challenging.

The ability of climate models to simulate changes in extreme weather situations is crucial for modelling associated changes in extreme discharge situations

along the rivers that are used as waterways in Germany. Deciphering the reasons for these situations and possible limitations of the actual generation of climate models is an important step to evaluate the robustness of simulated climate change signals that are used as input for policy guidance documents provided by BfG.

Against this background, the *BfG* supports the research idea of the proposal "EUROPEAN CLIMATE AND WEATHER EVENTS: INTERPRETATION AND ATTRIBUTION" (EUCLEIA). This proposal offers promising options to push climate services of BfG significantly closer towards practical applications.

The *BfG* is interested to take either an observer role in the EUCLEIA project or to act as a mediator between scientists and practitioners. The *BfG* also sees the possibility to contribute with own data and models to the project; e.g. if validation of EUCLEIA results is required in a hydrological modelling system for the international rivers and waterways of Central Europe.

Koblenz, 12.11.2012

Silke Rademacher

Deputy head of Department Water Balance, Forecasting and Predictions

Bundesanstalt für Gewässerkunde

Am Mainzer Tor 1
56068 Koblenz

Postfach 20 02 53
56002 Koblenz

Tel.: 02 61 / 13 06-0
Fax: 02 61 / 13 06-53 02

E-Mail: posteingang@bafg.de
Internet: www.bafg.de